CONTENTS

b) Special weather messages: special (SP), record special (RS), urgent special (USP).

(c) Disseminates

1) AWOS format Weather Messages to the Realtime Weather Processor (RWP) and Weather Communication Processor (WCP) collocated at the ACF received from all AWOS sites interfaced to the ADAS.

2) SAO format weather messages to the Weather Message Switching Center Replacement (WMSCR), including queued SAO form&weather messages that were not transmitted on schedule due to an interrupt in the WMSCR/ADAS communication link.

3) Lightning Detection Data (LDD) to AWOS sites.

(d) Archive all SAO format weather messages for a statically configurable period.

There is currently a functional requirement, stated in the AWOS/ADAS ICD, to transmit lightning data from ADAS to AWOS. There is no stated requirement to acquire the lightning data through an external interface. This definition of the requirement and the interface will be developed and added as a future enhancement.

1.3 Introduction. This specification provides functional, performance, development, test, andquality assurance requirements for the ADAS, and is organized as follows:

Section 1 includes the identification of this specification, the purpose of the ADAS, and the introduction.

Section 2 lists documents applicable to ADAS requirements to the extent described in this specification.

Section 3 contains functional, performance, interface, andsystem characteristics processing resources, quality factors, logistics, and precedence requirements. Quality factors cover reliability, maintainability, availability, and quality assurance. The three major functional areas of the ADAS are:

(a) Communications

(b) Processing

(c) Control.

This functional breakdown is not intended to imply a specific design for the ADAS system. Design will be the responsibility of the contractor. The communications function is organized into subfunctions, each of which corresponds to the International Standards Organization (ISO) seven-layer model for Open System Interconnection (OSI) per ISO/OSI 7498. The National Airspace Data Interchange Network (NADIN II) interface provides most connections. Each Interface Requirement Document (IRD) specifies requirements of its communication function specific to the AIMS.

Section 4 lists ADAS qualification requirements and presents a verification requirements cross-reference table showing how each requirement in Section 3 will be verified.

Section 5 lists requirements for preparations for delivery of the system, including packing and shipping considerations.

Section 6 contains acronym explanations, a glossary of ADAS-related terms, and index of referenced words.

The IRDs for the various ADAS external interfaces are found in their respective documents (cf 2.3). Relationships, implied or virtual, between layers in the ISO/OSI model and those in the connected systems are called the peer-to-peer protocol. This protocol is symmetrical. and is equally valid for either system. The IRDs, as well as containing the protocol, also describe optional user facilities supported for the establishment of permanent and switched virtual connections, network flow control, and delivery confirmation.

Appendix I delineates the specifications of a test simulator for the ADAS.

This functional breakdown is not intended to imply a specific design for the ADAS system. Design will be the responsibility of the contractor. The communications function is organized into subfunctions, each of which corresponds to the International Standards Organization (ISO) seven-layer model for Open System Interconnection (OSI) per ISO/OSI 7498. The National Airspace Data Interchange Network (NADIN II) interface provides most connections. Each Interface Requirement Document (IRD) specifies requirements of its communication function specific to the AIMS.

Section 4 lists ADAS qualification requirements and presents a verification requirements cross-reference table showing how each requirement in Section 3 will be verified.

Section 5 lists requirements for preparations for delivery of the system, including packing and shipping considerations.

Section 6 contains acronym explanations, a glossary of ADAS-related terms, and index of referenced words.

The IRDs for the various ADAS external interfaces are found in their respective documents (cf 2.3). Relationships, implied or virtual, between layers in the ISO/OSI model and those in the connected systems are called the peer-to-peer protocol. This protocol is symmetrical. and is equally valid for either system. The IRDs, as well as containing the protocol, also describe optional user facilities supported for the establishment of permanent and switched virtual connections, network flow control, and delivery confirmation.

Appendix I delineates the specifications of a test simulator for the ADAS.

MIL-STD-462	Measurements of Electromagnetic Interface Characteristics
MIL-STD-810	Environmental Test Methods and Engineering Guidelines, Engineering Micro Reproduction Systems
MIL-STD-889	Dissimilar Metals
MIL-STD-1189	Standard Bar Code Symbology
MIL-STD-1472	Human Engineering Design Criteria for Military Systems, Equipment, and Facilities
MIL-STD-1521	Technical Reviews and Audits for Systems, Equipment, and Computer Software

Other Government Agency

FCC Rules, Part 15, Subpart J	Rules and Regulations, Radio Frequency Devices/Computing Devices
FIPS PUB 78	Guideline for Implementing ADCCP
OSHA 29 CFR 1910	OSHA Safety and Health Standards

OTHER PUBLICATIONS:

FAA Regulations

FAA Order 1600.54	Security of FAA Automatic Data Processing Systems and Facilities
FAA Order 6000.30a	Airway Facilities Service Policy Decisions for the Maintenance Program in the 1980s
FMH-1	Federal Meteorological Handbook #1.
MIL-HDBK-217	Reliability Prediction of Electronic Equipment
MIL-HDBK-721	Corrosion and Corrosive Protection of Metals
NAS-IR-21020000	LCN/User System Interface IRD
NAS-IR-25082501	RWP/ADAS IRD
NAS-IR-25082503	WCP/ADAS IRD

NAS-IR-25082507	WMSCR/ADAS IRD
NAS-IR-43020001	NADIN Packet Mode Users X.25 IRD
NAS-IR-44010001	TE/Digital Interface IRD
NAS-IR-51030002	MPS/Automation Subsystems IRD
NAS-IR-92020000	CTS IRD

2.2 Non-Government Documents. The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

STANDARDS:

ANSI/IPC-A-610	American National Standards Institute/Institute of Printed Circuits Quality Standard A-610
ANSI X3.66	American National Standard for Advanced Data-Communication Control Procedures (ADCCP)

OTHER PUBLICATIONS:

CCITT X.25	1984 Interface between Data Terminal Equipment (DTE) for Terminals Operating in Packet Mode on public Data Networks
ISO/OSI 7498	International Standards Organization for Open-Interface
NEC-NFPA-70	National Electrical Code (NEC)

2.3 Sources of documents. Technical society and technical association specifications and standards, not indicated below, are generally available for reference from libraries. They are also distributed among technical groups and using Federal Agencies.

2.3.1 Sources of FAA documents. Copies of FAA specifications, standards, and publications may be obtained from the Contracting Officer, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, DC 20591. Requests should clearly identify the desired material by number and date, and state the intended use of the material.

NAS-IR-25082507	WMSCR/ADAS IRD
NAS-IR-43020001	NADIN Packet Mode Users X.25 IRD
NAS-IR-44010001	TE/Digital Interface IRD
NAS-IR-51030002	MPS/Automation Subsystems IRD
NAS-IR-92020000	CTS IRD

2.2 Non-Government Documents. The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

STANDARDS:

ANSI/IPC-A-610	American National Standards Institute/Institute of Printed Circuits Quality Standard A-610
ANSI X3.66	American National Standard for Advanced Data-Communication Control Procedures (ADCCP)

OTHER PUBLICATIONS:

CCITT X.25	1984 Interface between Data Terminal Equipment (DTE) for Terminals Operating in Packet Mode on public Data Networks
ISO/OSI 7498	International Standards Organization for Open-Interface
NEC-NFPA-70	National Electrical Code (NEC)

2.3 Sources of documents. Technical society and technical association specifications and standards, not indicated below, are generally available for reference from libraries. They are also distributed among technical groups and using Federal Agencies.

2.3.1 Sources of FAA documents. Copies of FAA specifications, standards, and publications may be obtained from the Contracting Officer, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, DC 20591. Requests should clearly identify the desired material by number and date, and state the intended use of the material.

3. REQUIREMENTS

3.1 System definition. This paragraph contains the functional, performance, and interface requirements for ADAS.

3.1.1 Missions. The primary mission of the ADAS is the collection, processing, and archival of automatic surface weather observations (AWOS) for distribution within NAS and other national users. In addition, ADAS will flag and issue special weather messages when predefined weather parameters are exceeded.

3.1.2 Threat. The principal threats to ADAS are environmental disaster, electrical grid failure, and unauthorized access. The threat of unauthorized systemaccess shall be minimized by built-in securityprovisions. The operating system shall ensure its own security and integrity and that of other software components. Access to the system shall be limited to authorized users. Security measures shall be in accordance with FAA Order 1600.54.

3.1.3 System Modes and States. ADAS shall exist in three distinct states and in the respective modes of each state as follows:

(a) Initialization State

1) Warm Start Mode

2) Cold Start Mode

(b) Operational State

1) Full Mode

2) Reduced Mode

(c) Shutdown State.

Additional categories of system status are identified in 3.1.3.2.

3.1.3.1 ADAS states. Figure 1 depicts the ADAS States and their relationships.

3.1.3.1.1 Initialization State. The Initialization State is entered from the power-downcondition. ADAS initialization processing sequences are performed and the system is prepared for ADAS mission processing: all volatile data stores take on known initialvalues, and all internal and external interfaces are initialized and activated. When initialization procedures are completed, execution may automatically pass to the Operational State. Alternatively, under other scenarios described below, execution may pass directly to the Shutdown State.

(a) ADAS specialist intervention shall be an option during the Initialization State.

(b) The ADAS system, under normal operation, shall complete Initialization State processing without human intervention.

(c) System initialization processing shall proceed under one of two modes:

1) Cold start: The ADAS shall execute without weather processing or status histories.

2) Warm start: The ADAS shall derive weather processing and status history from checkpoint data. This shall be the default mode.

3.1.3.1.2 Operational State. The Operational State is entered from the Initialization State when the system has become prepared for ADAS mission processing. Mission processing occurs primarily on a one-minute cycle of execution, consisting of phases of cycle preparation, cycle processing, and cycle completion activities. The cycle processing phase consists of the overlapping processes of weather data acquisition, processing, dissemination, and archival (cf 3.1.1). Cycle completion activities include at a minimum maintenance subsystem activities, system checkpointing, and configuration change management. Other (asynchronous) features of the Operational State include the specialist control interface, and data-driven input from external interfaces including error messages from the RWP(s) and WCP(s), Universal Coordinated Time (UTC) from the Coded Time Source (cm), and maintenance requests from the MPS.

(a) ADAS specialist intervention shall be an option during the Operational State (cf 3.1.4.3.2).

(b) Operational State processing shall take place under one of two modes:

1) Full: All configured maintenance subsystem data points are in their normal state (default mode).

2) Reduced: At least one maintenance subsystem data point (DP) is in an alarmed state (cf 3.1.4.2.2).

3.1.3.1.3 Shutdown State. The Shutdown State may be entered either from the Initialization State or the Operational State. During the Shutdown State, the ADAS performs the automatic, orderly disconnection, deinitialization, and closure of the ADAS system external and internal interfaces and data stores. The Shutdown State ends with ADAS software exit. There shall be no Specialist control interface during the Shutdown State.

(a) ADAS specialist intervention shall be an option during the Initialization State.

(b) The ADAS system, under normal operation, shall complete Initialization State processing without human intervention.

(c) System initialization processing shall proceed under one of two modes:

1) Cold start: The ADAS shall execute without weather processing or status histories.

2) Warm start: The ADAS shall derive weather processing and status history from checkpoint data. This shall be the default mode.

3.1.3.1.2 Operational State. The Operational State is entered from the Initialization State when the system has become prepared for ADAS mission processing. Mission processing occurs primarily on a one-minute cycle of execution, consisting of phases of cycle preparation, cycle processing, and cycle completion activities. The cycle processing phase consists of the overlapping processes of weather data acquisition, processing, dissemination, and archival (cf 3.1.1). Cycle completion activities include at a minimum maintenance subsystem activities, system checkpointing, and configuration change management. Other (asynchronous) features of the Operational State include the specialist control interface, and data-driven input from external interfaces including error messages from the RWP(s) and WCP(s), Universal Coordinated Time (UTC) from the Coded Time Source (cm), and maintenance requests from the MPS.

(a) ADAS specialist intervention shall be an option during the Operational State (cf 3.1.4.3.2).

(b) Operational State processing shall take place under one of two modes:

1) Full: All configured maintenance subsystem data points are in their normal state (default mode).

2) Reduced: At least one maintenance subsystem data point (DP) is in an alarmed state (cf 3.1.4.2.2).

3.1.3.1.3 Shutdown State. The Shutdown State may be entered either from the Initialization State or the Operational State. During the Shutdown State, the ADAS performs the automatic, orderly disconnection, deinitialization, and closure of the ADAS system external and internal interfaces and data stores. The Shutdown State ends with ADAS software exit. There shall be no Specialist control interface during the Shutdown State.

3.1.3.2 Additional status categories. Software status registers for additional ADAS macrostates and microstates shall be maintained and read by the Automatic Control function (cf 3.1.4.3.1) in the detection of failure and reconfiguration conditions, and in the guidance of the ADAS system through alternate performance scenarios. An ADAS specialist shall have the capability to modify the overall State of ADAS execution through the Start and Shutdown commands (cf 3.1.4.3.2.2.1).

3.1.3.2.1 Macrostate resisters. A macrostate is a dimension of the overall status of a system considered as an integral whole. ADAS system macrostate registers shall include at least the following:

(a) State: may take on the values Initialization, Operational, and Shutdown.

(b) Mode: may take on the values Full and Reduced.

(c) Startup/recovery: may take on the values Warm and Cold.

(d) Specialist logon: may take on the values Unattended by command, Unattended by timeout, and Attended.

(e) Last ADAS exit: may take on the values Normal and Abnormal.

3.1.3.2.2 Microstate registers. A microstate is the status of a discrete specified component or part of a system ADAS system microstates shall include at a minimum:

(a) Nonvolatile storage status: for each lowest identifiable nonvolatile data store, a status register recording various possible states of the store (e. g. OK, corrupted, incomplete, empty, nonexistent, etc.).

(b) External interface status: for each nominally configured external interface, a status register recording various possible states of the interface (e. g. active, inactive, connect pending, disconnect pending, connect failure, disconnect failure, transmission exception, deconfigured by command, etc.).

(c) Peripheral status: for each configured peripheral, a status register recording peripheral status in terms of hardware exception codes associated with requests for peripheral service.

(d) Acquisition data unit status: for each nominally configured external data acquisition source, a status register recording the internal status of the most recently received Application Data Unit (ADU).

3.1.3.2 Additional status categories. Software status registers for additional ADAS macrostates and microstates shall be maintained and read by the Automatic Control function (cf 3.1.4.3.1) in the detection of failure and reconfiguration conditions, and in the guidance of the ADAS system through alternate performance scenarios. An ADAS specialist shall have the capability to modify the overall State of ADAS execution through the Start and Shutdown commands (cf 3.1.4.3.2.2.1).

3.1.3.2.1 Macrostate resisters. A macrostate is a dimension of the overall status of a system considered as an integral whole. ADAS system macrostate registers shall include at least the following:

(a) State: may take on the values Initialization, Operational, and Shutdown.

(b) Mode: may take on the values Full and Reduced.

(c) Startup/recovery: may take on the values Warm and Cold.

(d) Specialist logon: may take on the values Unattended by command, Unattended by timeout, and Attended.

(e) Last ADAS exit: may take on the values Normal and Abnormal.

3.1.3.2.2 Microstate registers. A microstate is the status of a discrete specified component or part of a system ADAS system microstates shall include at a minimum:

(a) Nonvolatile storage status: for each lowest identifiable nonvolatile data store, a status register recording various possible states of the store (e. g. OK, corrupted, incomplete, empty, nonexistent, etc.).

(b) External interface status: for each nominally configured external interface, a status register recording various possible states of the interface (e. g. active, inactive, connect pending, disconnect pending, connect failure, disconnect failure, transmission exception, deconfigured by command, etc.).

(c) Peripheral status: for each configured peripheral, a status register recording peripheral status in terms of hardware exception codes associated with requests for peripheral service.

(d) Acquisition data unit status: for each nominally configured external data acquisition source, a status register recording the internal status of the most recently received Application Data Unit (ADU).

Figure 2. ADAS General Functional Flow Diagram

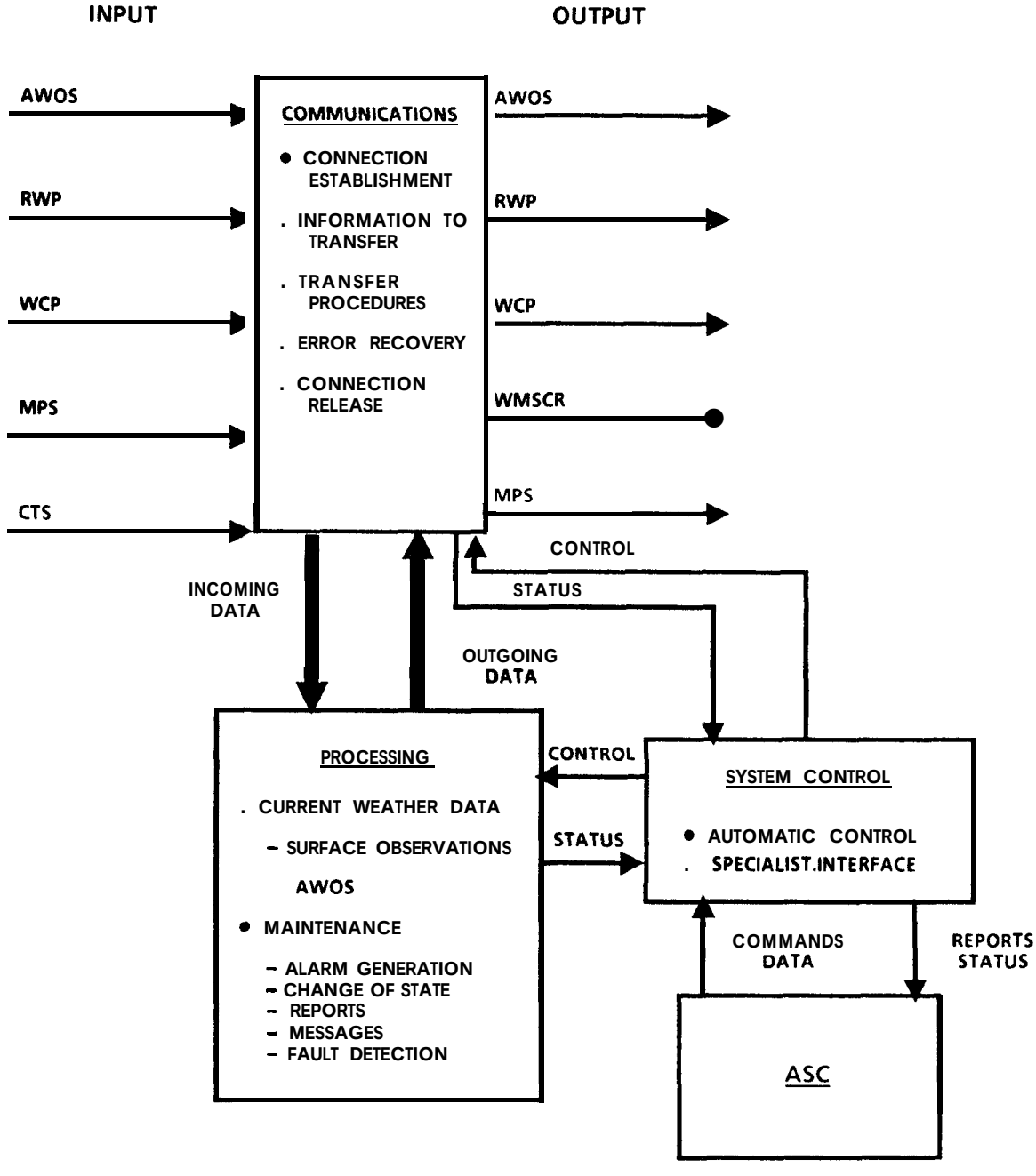


Figure 3. ADAS Communication Data Flow

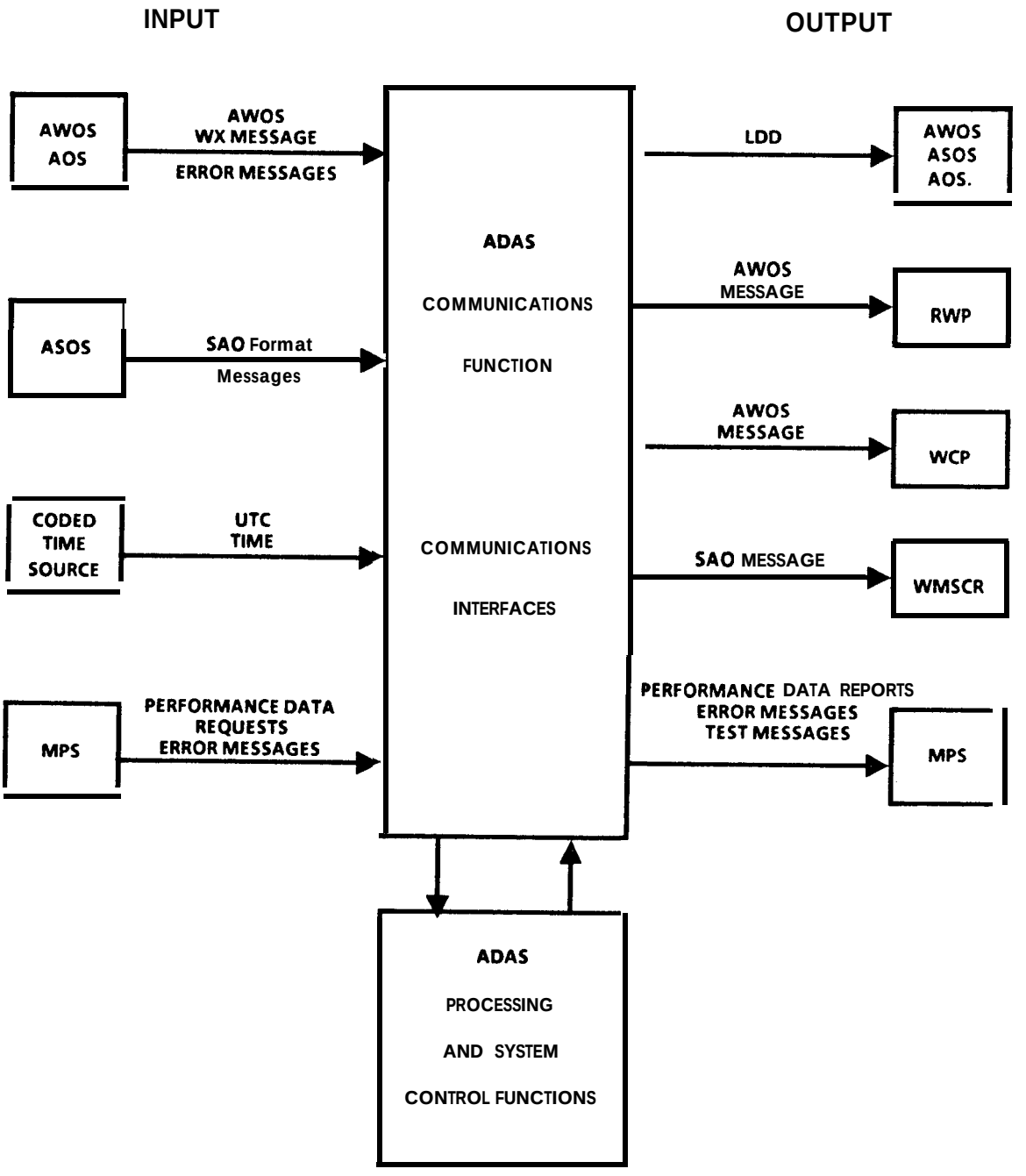
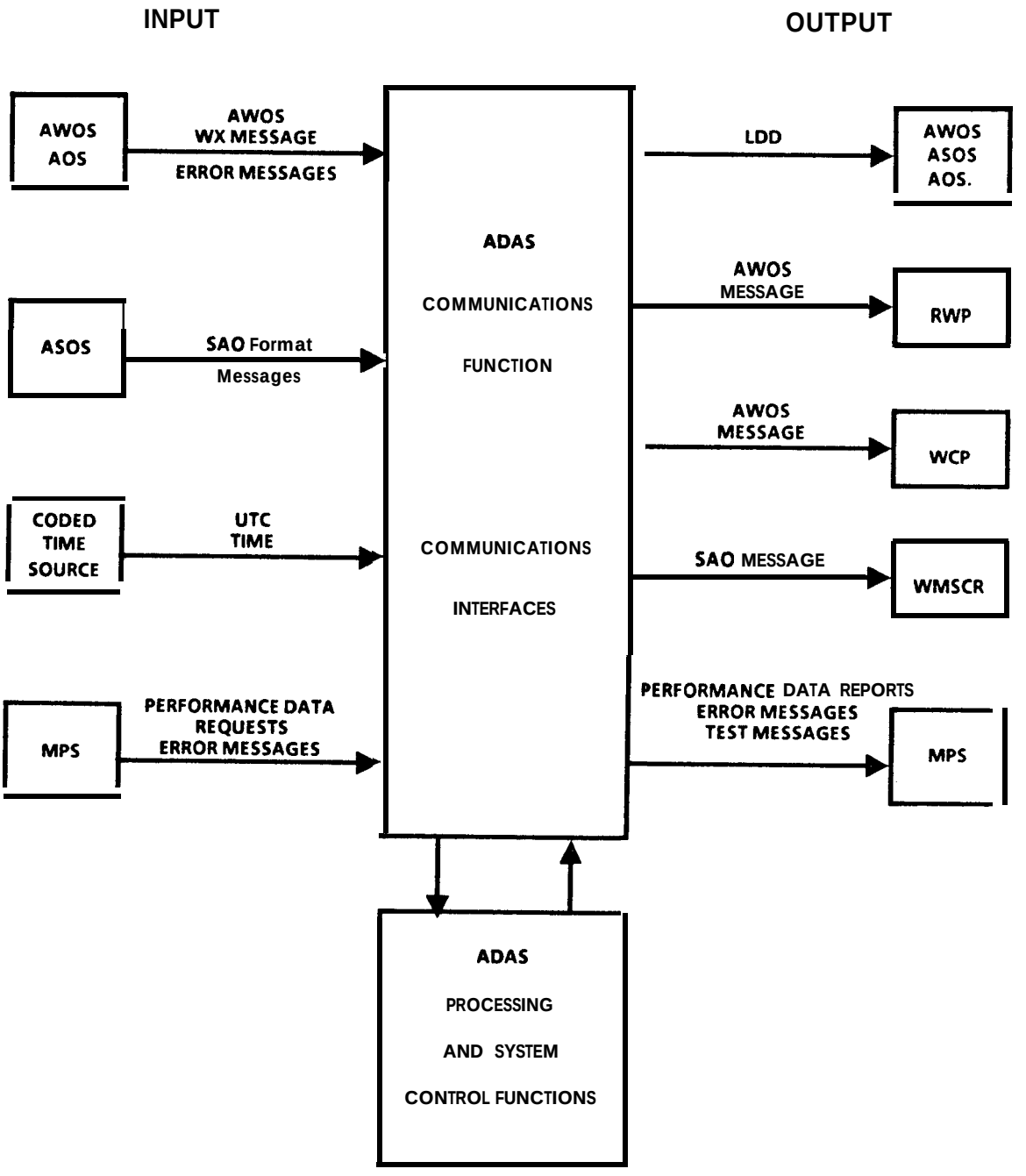


Figure 3. ADAS Communication Data Flow



(b) physical characteristics of the interface.

(c) Logical characteristics of the interface.

(d) Operational status of each interface.

(e) Statistical information about communication activity on the interface.

(f) System resources associated with each interface.

3.1.4.2 Processing function. Figure 4 depicts the ADAS processing function.

3.1.4.2.1 Weather data processing subfunction. The Weather Data Processing Function shall provide for real-time processing of incoming AWOS weather messages. The processing requirements consist of message forwarding, SAO conversion processing, and message distribution as described below.

3.1.4.2.1.1 Message forwarding. The Weather Data Processing Function shall provide for forwarding of surface weather observations to NAS users. This subfunction consists essentially of "pass-thru" processing as follows:

(a) All AWOS-format messages originating from AWOS sites shall be distributed to NAS users (cf 3.1.4.2.1.3.1).

(b) SAO-format messages originating from AWOS sites shall be distributed to NAS users (cf 3.1.4.2.1.3.2).

3.1.4.2.1.2 SAO conversion processing. AWOS-format messages originating from nonfederal AWOS sites shall be converted to SAO format for distribution.

3.1.4.2.1.2.1 Check date/time accuracy. The value of the date/time field of each AWOS incoming message shall be checked for agreement with ADAS time to a tolerance of plus or minus 1 minute. Failure of this check shall cause an alarm to be sent to the ADAS system console and the occurrence to be logged in the System Event Log. The original message shall be passed on to subsequent processing, as below.

3.1.4.2.1.2.2 Special generation. ADAS shall evaluate data from each AWOS/ASOS to determine whether or not any predefined conditions requiring the generation of a special message exist: if so, ADAS generates an SP, RS or USP weather message for transmission to WMSCR. The following conditions shall require generation of such reports:

Figure 4. ADAS Processing Function

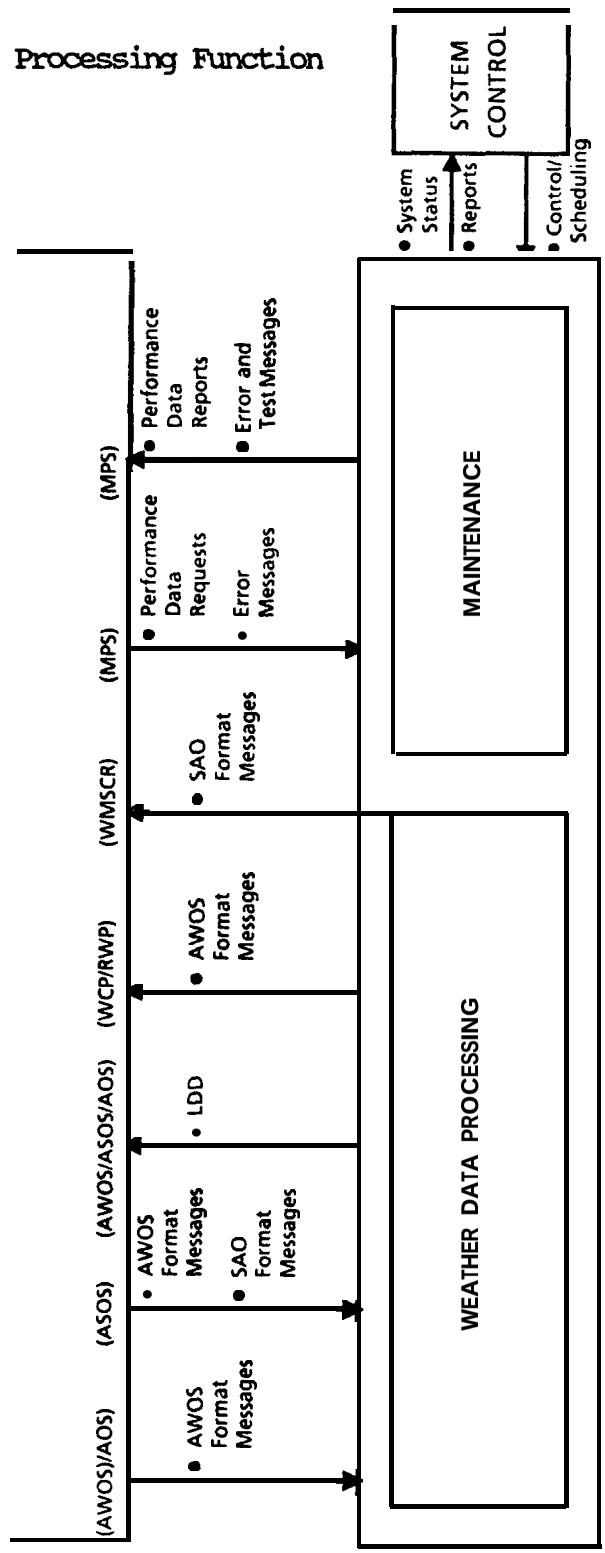
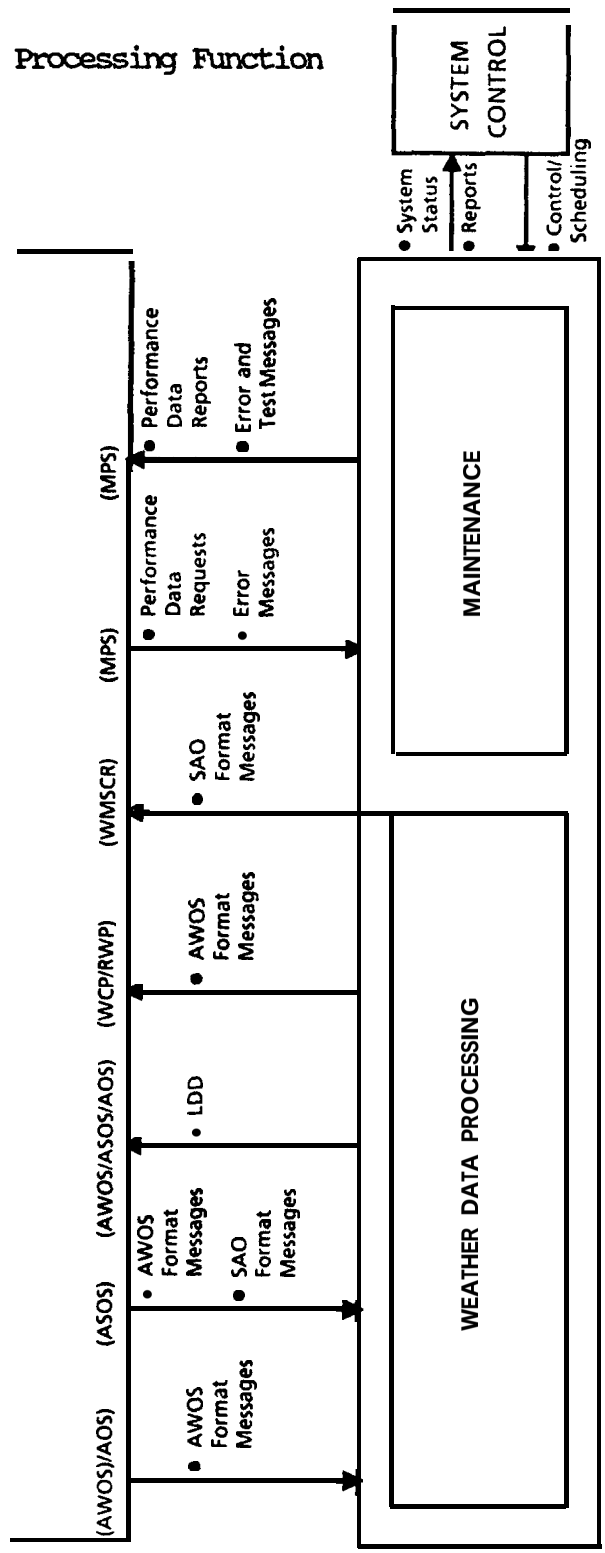


Figure 4. ADAS Processing Function



3.1.4.2.1.2.2.6 Thunderstorm. A thunderstorm begins, ends, or increases in intensity (T to T+).

3.1.4.2.1.2.2.7 Precipitation. Precipitation of one of the following types begins, ends, or (except for hail) changes intensity:

(a) Rail

(b) Freezing precipitation

(c) Ice pellets.

3.1.4.2.1.2.2.8 Runway Visual Range (RVR). The highest value reported for the designated RVR runway during the preceding 10 minutes decreases to 2400 feet or below, or, if below, increases to equal or exceed 2400 feet.

3.1.4.2.1.2.2.9 Pressure jump. A rise in pressure occurs at a rate exceeding 0.005 inches of mercury (inHg) per minute and:

(a) The rise is at least 0.02 inHg.

(b) The pressure for 20 minutes or more following the beginning of the jump remains at least 0.02 inHg higher than at the beginning.

(c) The beginning of the jump is distinctly separated from the beginning of any preceding jump by at least 20 minutes.

3.1.4.2.1.2.2.10 Resumption of service. A message from a particular weather observing site arrives after an elapsed down time that either exceeds 10 minutes or has caused encoding of a scheduled hourly (SA) observation from that site to be missed.

3.1.4.2.1.2.2.11 Urgent Specials. A tornado, water spout, or funnel cloud has been identified by a qualified observer at the AWOS operator-, and identified in the AWOS message. In this case the message generated shall be coded as USP.

3.1.4.2.1.2.3 NWS data processing The NWS data processing subfunction shall permit ADAS to process surface weather data for up to 137 sites per minute in order to generate additional weather products for inclusion in the SAO messages destined for the NWS. Some of these products comprise the "additive data groups" (cf FMH-1, Table A2-2.)

3.1.4.2.1.2.3.1 Additive data group. The specific "additive data group" parameters to be processed by ADAS shall be:

(a) 3-hour pressure tendency reported on a 3-hour cycle starting at 0000 Coordinated Universal Time (UTC).

3.1.4.2.1.2.2.6 Thunderstorm. A thunderstorm begins, ends, or increases in intensity (T to T+).

3.1.4.2.1.2.2.7 Precipitation. Precipitation of one of the following types begins, ends, or (except for hail) changes intensity:

(a) Rail

(b) Freezing precipitation

(c) Ice pellets.

3.1.4.2.1.2.2.8 Runway Visual Range (RVR). The highest value reported for the designated RVR runway during the preceding 10 minutes decreases to 2400 feet or below, or, if below, increases to equal or exceed 2400 feet.

3.1.4.2.1.2.2.9 Pressure jump. A rise in pressure occurs at a rate exceeding 0.005 inches of mercury (inHg) per minute and:

(a) The rise is at least 0.02 inHg.

(b) The pressure for 20 minutes or more following the beginning of the jump remains at least 0.02 inHg higher than at the beginning.

(c) The beginning of the jump is distinctly separated from the beginning of any preceding jump by at least 20 minutes.

3.1.4.2.1.2.2.10 Resumption of service. A message from a particular weather observing site arrives after an elapsed down time that either exceeds 10 minutes or has caused encoding of a scheduled hourly (SA) observation from that site to be missed.

3.1.4.2.1.2.2.11 Urgent Specials. A tornado, water spout, or funnel cloud has been identified by a qualified observer at the AWOS operator-, and identified in the AWOS message. In this case the message generated shall be coded as USP.

3.1.4.2.1.2.3 NWS data processing The NWS data processing subfunction shall permit ADAS to process surface weather data for up to 137 sites per minute in order to generate additional weather products for inclusion in the SAO messages destined for the NWS. Some of these products comprise the "additive data groups" (cf FMH-1, Table A2-2.)

3.1.4.2.1.2.3.1 Additive data group. The specific "additive data group" parameters to be processed by ADAS shall be:

(a) 3-hour pressure tendency reported on a 3-hour cycle starting at 0000 Coordinated Universal Time (UTC).

3.1.4.2.1.3.2 SAO-format dissemination. The dissemination of both "pass-thru" and ADAS-generated SAO-format messages shall be as follows:

(a) ADAS shall send SA messages once per hour at a statically configurable time each hour.

(b) ADAS shall send special (RS, SP, or USP) messages as they occur.

(c) On resumption of the WMSCR connection, ADAS shall send up to 3 hours of queued messages that were scheduled but not transmitted because of the interruption of connection.

3.1.4.2.1.3.3 Elapsed time constraint. The elapsed time between input of a message from an originating site and output of the resultant weather data product shall not exceed:

(a) 5 seconds for SAO-format special messages

(b) 10 seconds for SAO-format record observation messages and AWOS-format messages.

where elapsed time is measured between input to the application layer (ISO layer 7) at the external input interface and output from the application layer at the external output interface.

3.1.4.2.1.3.4 Output priority. Output of messages from the weather Data Processing Function to the Communications Function shall proceed according to the following descending order of priority:

(a) Urgent specials

(b) Specials

(c) SAO record observations and AWOS-format messages

(d) Queued SAO-format messages.

3.1.4.2.1.3.5 SAO message archival. All SAO-format messages processed by ADAS shall be archived for up to 15 days.

3.1.4.2.2 Maintenance processing subfunction.

(a) The ADAS shall include a Maintenance processing subfunction or subsystem in support of the MPS collocated at the ACF.

(b) ADAS/MPS interface characteristics shall be in accordance with NAS-IR-51030002.

3.1.4.2.2.1 Maintenance subsystem processing cycle.

(a) The Maintenance subsystem functions shall be performed within each 1-minute data processing cycle of the ADAS Operational State.

(b) The ADAS designshall ensure that execution of Maintenance subsystem functions be performed in a nonintrusive manner with respect to the ADAS mission.

3.1.4.2.2.2 Maintenance functions of Specialist interface.

(a) Maintenance subsystem functions shall be performed through a combination of automatic control and specialist commands.

(b) The Specialist Interface Function (cf 3.1.4.3.2.2.6) in concert with the ADAS System Console (ASC) shall provide local access for a specialist to those Maintenance subsystem functions which require parameter display, data point reset, alarm disabling/enabling, equipment certification, and diagnostic testing.

3.1.4.2.2.3 Maintenance functionalcharacteristics.The ADAS Maintenance subsystem shall meet thefollowingfunctionalrequirements.

3.1.4.2.2.3.1 Subsystem status and performance monitoring. The ADAS Maintenance subsystem shall automatically and continually obtain status and performance data from critical hardware and software elements of the ADAS.

3.1.4.2.2.3.2 Real-time monitoring.

(a) The ADAS Maintenance subsystem shall monitor the ADAS status and performance and exchange maintenance messages with the MPS communications interface under real-time control of the System Control Function (cf 3.1.4.3.1.1.2.2.3).

(b) Monitoring shall proceed in a manner that does not impede performance of the ADAS missions.

3.1.4.2.2.3.3 Monitored partitions. For the purpose of performance and statusmonitoring, the Maintenance subsystem shall partition ADAS into critical hardware and software reporting groups, hereafter referred to as Logical Units (LUs).

3.1.4.2.2.3.3.1 ADAS Logical Units. The Maintenance subsystem shall monitor, at a minimum, the following ADAS Logical Units:

(a) Time Management

(b) Operating System

3.1.4.2.2.1 Maintenance subsystem processing cycle.

(a) The Maintenance subsystem functions shall be performed within each 1-minute data processing cycle of the ADAS Operational State.

(b) The ADAS designshall ensure that execution of Maintenance subsystem functions be performed in a nonintrusive manner with respect to the ADAS mission.

3.1.4.2.2.2 Maintenance functions of Specialist interface.

(a) Maintenance subsystem functions shall be performed through a combination of automatic control and specialist commands.

(b) The Specialist Interface Function (cf 3.1.4.3.2.2.6) in concert with the ADAS System Console (ASC) shall provide local access for a specialist to those Maintenance subsystem functions which require parameter display, data point reset, alarm disabling/enabling, equipment certification, and diagnostic testing.

3.1.4.2.2.3 Maintenance functionalcharacteristics.The ADAS Maintenance subsystem shall meet thefollowingfunctionalrequirements.

3.1.4.2.2.3.1 Subsystem status and performance monitoring. The ADAS Maintenance subsystem shall automatically and continually obtain status and performance data from critical hardware and software elements of the ADAS.

3.1.4.2.2.3.2 Real-time monitoring.

(a) The ADAS Maintenance subsystem shall monitor the ADAS status and performance and exchange maintenance messages with the MPS communications interface under real-time control of the System Control Function (cf 3.1.4.3.1.1.2.2.3).

(b) Monitoring shall proceed in a manner that does not impede performance of the ADAS missions.

3.1.4.2.2.3.3 Monitored partitions. For the purpose of performance and statusmonitoring, the Maintenance subsystem shall partition ADAS into critical hardware and software reporting groups, hereafter referred to as Logical Units (LUs).

3.1.4.2.2.3.3.1 ADAS Logical Units. The Maintenance subsystem shall monitor, at a minimum, the following ADAS Logical Units:

(a) Time Management

(b) Operating System

separate processors are implemented, and one status DP for each communications channel and associated logical interface(s) of each processor. In addition, software (protocol) performance DPs with alarm generation based on error severity, rates of occurrence, or recoverability shall be associated with the following logical interfaces:

(a) n AWOS, n an adaptable number from 1 to 137

(b) 1 RWP

(c) 1 WCP

(d) 1 WMSCR

(e) 1 MPS

(f) 1 CTS.

3.1.4.2.2.3.3.2.4 Peripheral devices. DPs related to the performance of hardware peripherals shall generate alarms based on error severity, rates of occurrence, or recoverability appropriate to each configured peripheral device.

3.1.4.2.2.3.3.2.5 Status. DPs related to the status of overall system operation shall include at least the following:

(a) System State

(b) System Mode

(c) Startup/recovery mode: Warm or cold for most recent system initialization

(d) LU status: Presence or absence of alarm conditions in the respective LU reporting groups

(e) Configuration: Current configuration/status of external interfaces

(f) Maintenance subsystem resets: Record of last Maintenance subsystem initialization

(g) Specialist status: Togged on, logged off by command, logged off by timeout.

3.1.4.2.2.3.4 Maintenance data. The ADAS Maintenance subsystem&all maintain local data for its exclusiveuse.

separate processors are implemented, and one status DP for each communications channel and associated logical interface(s) of each processor. In addition, software (protocol) performance DPs with alarm generation based on error severity, rates of occurrence, or recoverability shall be associated with the following logical interfaces:

(a) n AWOS, n an adaptable number from 1 to 137

(b) 1 RWP

(c) 1 WCP

(d) 1 WMSCR

(e) 1 MPS

(f) 1 CTS.

3.1.4.2.2.3.3.2.4 Peripheral devices. DPs related to the performance of hardware peripherals shall generate alarms based on error severity, rates of occurrence, or recoverability appropriate to each configured peripheral device.

3.1.4.2.2.3.3.2.5 Status. DPs related to the status of overall system operation shall include at least the following:

(a) System State

(b) System Mode

(c) Startup/recovery mode: Warm or cold for most recent system initialization

(d) LU status: Presence or absence of alarm conditions in the respective LU reporting groups

(e) Configuration: Current configuration/status of external interfaces

(f) Maintenance subsystem resets: Record of last Maintenance subsystem initialization

(g) Specialist status: Togged on, logged off by command, logged off by timeout.

3.1.4.2.2.3.4 Maintenance data. The ADAS Maintenance subsystem&all maintain local data for its exclusiveuse.

separate processors are implemented, and one status DP for each communications channel and associated logical interface(s) of each processor. In addition, software (protocol) performance DPs with alarm generation based on error severity, rates of occurrence, or recoverability shall be associated with the following logical interfaces:

(a) n AWOS, n an adaptable number from 1 to 137

(b) 1 RWP

(c) 1 WCP

(d) 1 WMSCR

(e) 1 MPS

(f) 1 CTS.

3.1.4.2.2.3.3.2.4 Peripheral devices. DPs related to the performance of hardware peripherals shall generate alarms based on error severity, rates of occurrence, or recoverability appropriate to each configured peripheral device.

3.1.4.2.2.3.3.2.5 Status. DPs related to the status of overall system operation shall include at least the following:

(a) system state

(b) System Mode

(c) Startup/recovery mode: Warm or cold for most recent system initialization

(d) LU status: Presence or absence of alarm conditions in the respective LU reporting groups

(e) Configuration: Current configuration/status of external interfaces

(f) Maintenance subsystem resets: Record of last Maintenance subsystem initialization

(g) Specialist status: Togged on, logged off by command, logged off by timeout.

3.1.4.2.2.3.4 Maintenance data. The ADAS Maintenance subsystem&all maintain local data for its exclusiveuse.

separate processors are implemented, and one status DP for each communications channel and associated logical interface(s) of each processor. In addition, software (protocol) performance DPs with alarm generation based on error severity, rates of occurrence, or recoverability shall be associated with the following logical interfaces:

(a) n AWOS, n an adaptable number from 1 to 137

(b) 1 RWP

(c) 1 WCP

(d) 1 WMSCR

(e) 1 MPS

(f) 1 CTS.

3.1.4.2.2.3.3.2.4 Peripheral devices. DPs related to the performance of hardware peripherals shall generate alarms based on error severity, rates of occurrence, or recoverability appropriate to each configured peripheral device.

3.1.4.2.2.3.3.2.5 Status. DPs related to the status of overall system operation shall include at least the following:

(a) system state

(b) System Mode

(c) Startup/recovery mode: Warm or cold for most recent system initialization

(d) LU status: Presence or absence of alarm conditions in the respective LU reporting groups

(e) Configuration: Current configuration/status of external interfaces

(f) Maintenance subsystem resets: Record of last Maintenance subsystem initialization

(g) Specialist status: Togged on, logged off by command, logged off by timeout.

3.1.4.2.2.3.4 Maintenance data. The ADAS Maintenance subsystem&all maintain local data for its exclusiveuse.

separate processors are implemented, and one status DP for each communications channel and associated logical interface(s) of each processor. In addition, software (protocol) performance DPs with alarm generation based on error severity, rates of occurrence, or recoverability shall be associated with the following logical interfaces:

(a) n AWOS, n an adaptable number from 1 to 137

(b) 1 RWP

(c) 1 WCP

(d) 1 WMSCR

(e) 1 MPS

(f) 1 CTS.

3.1.4.2.2.3.3.2.4 Peripheral devices. DPs related to the performance of hardware peripherals shall generate alarms based on error severity, rates of occurrence, or recoverability appropriate to each configured peripheral device.

3.1.4.2.2.3.3.2.5 Status. DPs related to the status of overall system operation shall include at least the following:

(a) system state

(b) System Mode

(c) Startup/recovery mode: Warm or cold for most recent system initialization

(d) LU status: Presence or absence of alarm conditions in the respective LU reporting groups

(e) Configuration: Current configuration/status of external interfaces

(f) Maintenance subsystem resets: Record of last Maintenance subsystem initialization

(g) Specialist status: Togged on, logged off by command, logged off by timeout.

3.1.4.2.2.3.4 Maintenance data. The ADAS Maintenance subsystem&all maintain local data for its exclusiveuse.

separate processors are implemented, and one status DP for each communications channel and associated logical interface(s) of each processor. In addition, software (protocol) performance DPs with alarm generation based on error severity, rates of occurrence, or recoverability shall be associated with the following logical interfaces:

(a) n AWOS, n an adaptable number from 1 to 137

(b) 1 RWP

(c) 1 WCP

(d) 1 WMSCR

(e) 1 MPS

(f) 1 CTS.

3.1.4.2.2.3.3.2.4 Peripheral devices. DPs related to the performance of hardware peripherals shall generate alarms based on error severity, rates of occurrence, or recoverability appropriate to each configured peripheral device.

3.1.4.2.2.3.3.2.5 Status. DPs related to the status of overall system operation shall include at least the following:

(a) system state

(b) System Mode

(c) Startup/recovery mode: Warm or cold for most recent system initialization

(d) LU status: Presence or absence of alarm conditions in the respective LU reporting groups

(e) Configuration: Current configuration/status of external interfaces

(f) Maintenance subsystem resets: Record of last Maintenance subsystem initialization

(g) Specialist status: Togged on, logged off by command, logged off by timeout.

3.1.4.2.2.3.4 Maintenance data. The ADAS Maintenance subsystem&all maintain local data for its exclusiveuse.

logon screen to the ASC at the known state of the system when storage and time initialization is complete (cf 3.1.4.3.2).

(a) The control functionshall permit a configurable interval of time in which to logon to ADAS.

(b) If this time period elapses without a logon, Initialization State procedures shall continue automatically.

(c) If logged on, a specialist shall have the capability to complete or modify configuration data, or provide manual overrides to data already initialized.

3.1.4.3.1.1.1.2 Initialization communications control. The communications function shall be controlled by status and adaptation data.

(a) The control function shall direct initialization and starting of the CIS interface component of the Communications function.

(b) Initial CIS input shall be used to initialize the ADAS system time/date with UTC time (cf 3.1.4.3.1.1.4).

(c) Following specialist interface activity, if any, the control function shallautomatically start the remaining components of the communications interface function, leading to the initialization and establishment of all remaining required internal and external interfaces.

(d) The ADAS shall detect failures in any of the interfaces andperform required failure procedures, asdiscussed in the failure scenarios for external systems in 3.1.4.3.1.2 and 3.1.4.3.1.3.

3.1.4.3.1.1.2 Operational State procedures.

(a) On entry to the ADAS Operational State, the automatic control functionshallsignalthe State Change message processor component of the Maintenance processing subfunction to enqueue a State Change message to the MPS interfaceoutputcomponent of the Communications subfunction.

(b) The automatic control function shall enable the ADAS specialist control interface log on function for the Operational State (cf 3.1.4.3.2).

(c) During each minute of Operational State execution, the control function shall guide ADAS through the following four phases of activity:

logon screen to the ASC at the known state of the system when storage and time initialization is complete (cf 3.1.4.3.2).

(a) The control functionshall permit a configurable interval of time in which to logon to ADAS.

(b) If this time period elapses without a logon, Initialization State procedures shall continue automatically.

(c) If logged on, a specialist shall have the capability to complete or modify configuration data, or provide manual overrides to data already initialized.

3.1.4.3.1.1.1.2 Initialization communications control. The communications function shall be controlled by status and adaptation data.

(a) The control function shall direct initialization and starting of the CIS interface component of the Communications function.

(b) Initial CIS input shall be used to initialize the ADAS system time/date with UTC time (cf 3.1.4.3.1.1.4).

(c) Following specialist interface activity, if any, the control function shallautomatically start the remaining components of the communications interface function, leading to the initialization and establishment of all remaining required internal and external interfaces.

(d) The ADAS shall detect failures in any of the interfaces andperform required failure procedures, asdiscussed in the failure scenarios for external systems in 3.1.4.3.1.2 and 3.1.4.3.1.3.

3.1.4.3.1.1.2 Operational State procedures.

(a) On entry to the ADAS Operational State, the automatic control functionshallsignalthe State Change message processor component of the Maintenance processing subfunction to enqueue a State Change message to the MPS interfaceoutputcomponent of the Communications subfunction.

(b) The automatic control function shall enable the ADAS specialist control interface log on function for the Operational State (cf 3.1.4.3.2).

(c) During each minute of Operational State execution, the control function shall guide ADAS through the following four phases of activity:

Aging shall be determined from the point of initial receipt at the AWOS ISO/OSI application layer input interface of the oldest minute-by-minute weather product data in a given output queue buffer.

3.1.4.3.1.1.2.2 Operational processing control. Automatic operation of the processing function shall be controlled by system time, status, and adaptation data.

3.1.4.3.1.1.2.2.1 Mission preparation processing control. Mission preparation shall be enabled by the control function as it determines that a new one-minute mission cycle has begun.

(a) If either the mission or completion phases of the most recent cycle is still active at this point, the control function shall direct termination of the mission phase (if active) and defer new cycle preparation processing until the current cycle completion phase has executed and terminated.

3.1.4.3.1.1.2.2.2 Weather data processing control. Weather data processing shall be demand-driven by the receipt of AWOS products.

3.1.4.3.1.1.2.2.3 Maintenance synchronous processing control. Maintenance subsystem processing shall take place during a known state of the system and therefore be enabled by the control function on the detection of the mission-complete condition.

(a) The cycle mission phase shall be determined to be complete at the point when the last required message buffer for downstream nodes has been delivered to the communications function for output.

(b) Maintenance processing shall continue until all unscheduled messages for the MPS (cf 3.1.4.2.2) have been formulated and delivered to the MPS communications interface.

3.1.4.3.1.1.2.2.4 Checkmint processing control. Checkpoint processing shall capture a known state of the system and therefore be enabled by the control function on the completion of Maintenance subsystem processing.

3.1.4.3.1.1.2.2.5 Configuration change processing control. Configuration change processing shall be implemented so as not to interfere with normal automatic mission processing.

3.1.4.3.1.1.3 Shutdown state procedures. Automatic operation of the Shutdown State procedures shall be controlled by status and adaptation data.

(a) On entering the Shutdown State, the control functions shall signal the State Change message processor component of the Maintenance subsystem

processing subfunction to enqueue a State Change message to the MPS interface output component of the Communications subfunction.

(b) The control function shall direct the automatic, orderly disconnection, deinitialization, and closure of the ADAS system external and internal interfaces and data stores.

(c) There shall be no Specialist control interface during the Shutdown state.

3.1.4.3.1.1.3.1 Shutdown communications control. The communications function shall be controlled by status and adaptation data.

(a) The communications function shall be enabled by the control function for the deactivation of all active external interfaces.

(b) The ADAS shall automatically detect failures in any interface and perform required event logging procedures.

(c) Failure retry and recovery procedures shall not be undertaken in the shutdown state.

3.1.4.3.1.1.3.2 Shutdown processing control. The processing function shall not be enabled during the Shutdown State.

3.1.4.3.1.1.4 Time management and control. The management and control of time within the ADAS system shall meet the following requirements:

(a) CTS data shall be the UTC time reference standard for ADAS.

(b) The CTS interface shall be initialized and started during ADAS Initialization State processing (cf 3.1.4.3.1.1.1.2).

(c) Initial CTS UTC time/date data shall be utilized to establish the system time.

(d) F&synchronization and observation of system time drift shall be performed at periodic intervals thereafter.

(e) System time shall be maintained within plus or minus one second of UTC while the CTS signal is available to the ADAS.

Failure processing scenarios for time-related failures are discuss& in 3.1.4.3.1.2.6.

3.1.4.3.1.2 Failure operation. The requirements pertaining to automatic control of ADAS failure operation and report- shall be governed by the requirement that ADAS operate normally as an unattended system (cf 3.1.4.3.1),

with human specialist intervention representing no more than a contingent option.

(a) The ADAS shall report state changes and all Maintenance data point alarms to the MPS (cf 3.1.4.2.2) during the Operational State.

(b) All failures and exceptions involving either hardware or software shall be reported to the system event log control subfunction (cf 3.1.4.3.1.3).

(c) The event log subfunction shall undertake immediate failure reporting procedures on the ASC whenever the system is currently attended by a logged-in ADAS specialist.

(d) The continued failure of a critical system component beyond a reasonable limit on retry/restart efforts shall lead to the system failure condition and the automatic transition to the Shutdown State from either the Initialization State or the Operational State.

(e) Reasonable limits on retry/restart efforts specific to individual components shall be determined on implementation.

3.1.4.3.1.2.1 Software failure. A critical software activity is one required for the operation of the communications, processing, and control functions.

(a) The AIMS automatic control function shall monitor the operation of all critical software activities and detect the operational failure of any such activity.

(b) The ADAS shall imediately and automatically attempt to apply appropriate retry/restart algorithms to the failed element.

(c) Continued failure of the critical activity shall lead to a system failure condition and the automatic transition to the Shutdown State.

(d) Software failures detected while within the Shutdown State shall not be treated recursively.

3.1.4.3.1.2.2 Hardware failure. Hardware failure shall be automatically detected and appropriate automated action taken by the surviving equipment to retry/restart the failed equipment.

3.1.4.3.1.2.2.1 Critical equipment. The ADAS critical equipment shall consist of the Central Processing Unit (CPU), the communications equipment supporting the required external interfaces, and the fixed volatile and nonvolatile storage.

with human specialist intervention representing no more than a contingent option.

(a) The ADAS shall report state changes and all Maintenance data point alarms to the MPS (cf 3.1.4.2.2) during the Operational State.

(b) All failures and exceptions involving either hardware or software shall be reported to the system event log control subfunction (cf 3.1.4.3.1.3).

(c) The event log subfunction shall undertake immediate failure reporting procedures on the ASC whenever the system is currently attended by a logged-in ADAS specialist.

(d) The continued failure of a critical system component beyond a reasonable limit on retry/restart efforts shall lead to the system failure condition and the automatic transition to the Shutdown State from either the Initialization State or the Operational State.

(e) Reasonable limits on retry/restart efforts specific to individual components shall be determined on implementation.

3.1.4.3.1.2.1 Software failure. A critical software activity is one required for the operation of the communications, processing, and control functions.

(a) The AIMS automatic control function shall monitor the operation of all critical software activities and detect the operational failure of any such activity.

(b) The ADAS shall imediately and automatically attempt to apply appropriate retry/restart algorithms to the failed element.

(c) Continued failure of the critical activity shall lead to a system failure condition and the automatic transition to the Shutdown State.

(d) Software failures detected while within the Shutdown State shall not be treated recursively.

3.1.4.3.1.2.2 Hardware failure. Hardware failure shall be automatically detected and appropriate automated action taken by the surviving equipment to retry/restart the failed equipment.

3.1.4.3.1.2.2.1 Critical equipment. The ADAS critical equipment shall consist of the Central Processing Unit (CPU), the communications equipment supporting the required external interfaces, and the fixed volatile and nonvolatile storage.

the initial failure of any adaptive data due to nonexistence, corruption, etc.

(b) If the failure state of this data remains unmodified by any specialist intervention, a system failure condition shall be caused with execution automatically passing to the Shutdown State.

3.1.4.3.1.2.5 Failure of interfacing systems. The ADAS shall react to an interface failure in a manner consistent with the interface type as defined below.

3.1.4.3.1.2.5.1 CTS failure. The failure of the CTS shall cause the ADAS to generatea noncritical event notification to the event log control function (cf 3.1.4.3.1.3), to mark the appropriate software status registers (cf 3.1.3.2), and to continue processing activities with system time derived from any appropriate internal design feature.

3.1.4.3.1.2.5.2 AWOS failure.

(a) The failure of any site or combination of sites shall cause the ADAS to generate a noncritical event notification to the event log control function (cf 3.1.4.3.1.3), with appropriate interface status recorded (cf 3.1.3.2).

(b) All failed sites shall continue to be polled at the normal interval unless explicitly deconfigured by an ADAS specialist.

3.1.4.3.1.2.5.3 WMSCR failure.

(a) The failure of the WMSCR shall cause the ADAS to retain WMSCR data for up to 3 hours for eventual transmission to a restored WMSCR.

(b) The ADAS shall attempt to restore ADAS/WMSCR service.

(c) The ADAS shall generate a noncritical event notification to the event log control function (cf 3.1.4.3.1.3), with appropriate interface status recorded (cf 3.1.3.2).

3.1.4.3.1.2.5.4 RWP failure.

(a) The failure of a RWP shall generate a noncritical event notification to the event log control function (cf 3.1.4.3.1.3), with appropriate interface status recorded (cf 3.1.3.2).

(b) The ADAS shall attempt to restore service for the affected ADAS/RWP interface.

3.1.4.3.1.2.5.5 WCP failure.

(a) The failure of a WCP shall generate a noncritical event notification to the event log control function (cf 3.1.4.3.1.3), with appropriate interface status recorded (cf 3.1.3.2).

(b) The ADAS shall attempt to restore service for the affected ADAS/WCP interface.

3.1.4.3.1.2.5.6 MPS failure.

(a) The failure of the MPS shall generate a noncritical event notification to the event log control function (cf 3.1.4.3.1.3), with appropriate interface status recorded (cf 3.1.3.2).

(b) The ADAS shall attempt to restore service for the ADAS/MPS interface.

3.1.4.3.1.2.6 Service restoration. The ADAS shall automatically begin orderly resumption of operation following restoration of power. The following four Initialization State functions shall be performed:

(a) Status of nonvolatile data stores shall be determined.

(b) Valid, un-aged system checkpoint data shall modify the initialization scenario from Cold Start to Warm Start.

(c) All internal interfaces shall be reinitialized.

(d) All external interface connections shall be reestablished.

3.1.4.3.1.3 System event logging function. The ADAS shall have an event recording and display capability with the following requirements:

(a) All ADAS processing modules shall issue notices to the system event logging function describing significant events, their importance, and the time of occurrence.

(b) The ADAS shall record all events to a system event log.

(c) All critical or failure events (cf 3.1.4.3.1.3.3) shall also be enqueued to the system printer output function.

(d) When the system is currently attended by a logged-in ADAS specialist, critical and failure event notifications shall also be displayed on the ASC screen (cf 3.1.4.3.2.1.7).

(e) Event log coverage shall include at least the most recent 24 hours of operation.

(a) The failure of a WCP shall generate a noncritical event notification to the event log control function (cf 3.1.4.3.1.3), with appropriate interface status recorded (cf 3.1.3.2).

(b) The ADAS shall attempt to restore service for the affected ADAS/WCP interface.

3.1.4.3.1.2.5.6 MPS failure.

(a) The failure of the MPS shall generate a noncritical event notification to the event log control function (cf 3.1.4.3.1.3), with appropriate interface status recorded (cf 3.1.3.2).

(b) The ADAS shall attempt to restore service for the ADAS/MPS interface.

3.1.4.3.1.2.6 Service restoration. The ADAS shall automatically begin orderly resumption of operation following restoration of power. The following four Initialization State functions shall be performed:

(a) Status of nonvolatile data stores shall be determined.

(b) Valid, un-aged system checkpoint data shall modify the initialization scenario from Cold Start to Warm Start.

(c) All internal interfaces shall be reinitialized.

(d) All external interface connections shall be reestablished.

3.1.4.3.1.3 System event logging function. The ADAS shall have an event recording and display capability with the following requirements:

(a) All ADAS processing modules shall issue notices to the system event logging function describing significant events, their importance, and the time of occurrence.

(b) The ADAS shall record all events to a system event log.

(c) All critical or failure events (cf 3.1.4.3.1.3.3) shall also be enqueued to the system printer output function.

(d) When the system is currently attended by a logged-in ADAS specialist, critical and failure event notifications shall also be displayed on the ASC screen (cf 3.1.4.3.2.1.7).

(e) Event log coverage shall include at least the most recent 24 hours of operation.

ADUs, received over any external interface, as well as any error notifications from communicating interfaces related to erroneous messages previously generated by ADAS, with the following requirements:

(a) The ADAS shall record all erroneous messages to a system erroneous message (error) log.

(b) The recording of any erroneous message in the error log shall be accompanied by a noncritical event notification in the event log (cf 3.1.4.3.1.3).

(c) Error log coverage shall include at least the most recent 24 hours of operation.

(d) Once every 24 hours the current working error log shall be placed in archive in the place of any existing log archive, and a new working error log created.

(e) The error log item shall consist of at least the following fields:

1) Erroneous message number (cyclical code identifying the error)

2) Message date/time

3) Associated event number from the event log

4) Errorcode

5) Contents of erroneous message.

3.1.4.3.1.4.1 Erroneous message number. The ADAS shall number cyclically each erroneous message, with the message number automatically reset once every 24 hours when the working log is archived.

3.1.4.3.1.4.2 Message date/time. The ADAS shall append automatically the current date and time to each erroneous message, with the date consisting of the current year (if present in the CTS message), month, and day, and the time consisting of the hour, minute, and second that the message was received at the ADAS ISO/OSI application layer.

3.1.4.3.1.4.3 Associated event number. The ADAS shall append the associated noncritical event notification number (cf 3.1.4.3.1.3.1).

3.1.4.3.1.4.4 Error code. The ADAS shall record the associated message error code, if any.

3.1.4.3.1.4.5 Contents of erroneous message. The ADAS shall record the

contents of the erroneous messageas abyte-by-byte image without regard to immediate printability.

3.1.4.3.2 ADAS specialist control interface. This section defines the functional characteristics of the ADAS System Console (ASC) specialist interface and the ADASspecialist control functionsandoperational requirements.

3.1.4.3.2.1 General interface characteristics. The ADAS shall have one ASC as a control position for an ADAS specialist as follows:

(a) The ADAS control position shall be capable of performing all defined command functions; however, these shall be security-restricted (cf 3.1.4.3.2.1.3).

(b) The ASC shall consist of a video control terminal, keyboard, and an associated hard-copy printer.

(c) The video control terminal shall provide capabilities for interactive conversation with the ADAS Specialist and for full-screen editing.

3.1.4.3.2.1.1 Specialist control. Specialist control functions shall be available during the execution of ADAS application software during either the Initialization State or the Operational State.

(a) Initialization State control functions shall be performed with the following options or constraints:

1) The specialist log on screen shall be presented only for a adaptable interval of time. If no successful log on is performed within this time, execution shall automatically pass to normal initializationprocedures under automatic control.

2) The Start ADAS command shall be a specialist control option (cf 3.1.4.3.2.2.1.1).

(b) Operational State control functions shall be performed with the following options or constraints:

1) The Logout command (cf 3.1.4.3.2.2.1.3) shall be a specialist control option.

2) Certain specialist commands shall be identified in the design as "intrusive", consisting of those (re)configuration or adaptation change commands available during the OperationalStatewhose immediate, uncoordinated execution could interfere destructively with on-going automatic mission execution. Design shall ensure

that intrusive commands are executed by the system in such a manner as not to interfere with mission processing.

3) Specialist control of active data (the SAO message archive and the system logs) shall not interfere with normal automatic Operational State usage of such data; in case of conflict, the latter procedures shall take priority.

(c) There shall be no ADAS specialist control permitted during the shutdown state.

3.1.4.3.2.1.2 Command syntax.

(a) The ADAS control commands shall have a consistency of syntax and shall be oriented toward ease of operation.

(b) Specialist keyboard activities shall be menu-driven to the level where parameter value entry is required.

(c) The interface shall have a Help function (structured referencing to user control syntax and context-sensitive comma&descriptions) available at all times.

3.1.4.3.2.1.3 ADAS security. Security features shall include the following:

(a) The ADAS shall restrict its command capabilities by a security feature, with at least two levels of privilege:

1) System Manager (all functions).

2) ADAS Specialist (nonsecurity functions only).

(b) All users shall be required to execute a log-on procedure, requiring the entry of a user token/name and (unechoed) password.

(c) The assignment of tokens and passwords by a system manager shall be the only security function.

(d) A configurable timeout parameter shall be applied against the current field-terminating keystroke throughout interface processing. As the result of such a keyboard timeout:

1) The user shall be automatically logged out, and:

2) Control shall be returned to the log on procedure (Operational State) or the automatic control function (Initialization State).

that intrusive commands are executed by the system in such a manner as not to interfere with mission processing.

3) Specialist control of active data (the SAO message archive and the system logs) shall not interfere with normal automatic Operational State usage of such data; in case of conflict, the latter procedures shall take priority.

(c) There shall be no ADAS specialist control permitted during the shutdown state.

3.1.4.3.2.1.2 Command syntax.

(a) The ADAS control commands shall have a consistency of syntax and shall be oriented toward ease of operation.

(b) Specialist keyboard activities shall be menu-driven to the level where parameter value entry is required.

(c) The interface shall have a Help function (structured referencing to user control syntax and context-sensitive comma&descriptions) available at all times.

3.1.4.3.2.1.3 ADAS security. Security features shall include the following:

(a) The ADAS shall restrict its command capabilities by a security feature, with at least two levels of privilege:

1) System Manager (all functions).

2) ADAS Specialist (nonsecurity functions only).

(b) All users shall be required to execute a log-on procedure, requiring the entry of a user token/name and (unechoed) password.

(c) The assignment of tokens and passwords by a system manager shall be the only security function.

(d) A configurable timeout parameter shall be applied against the current field-terminating keystroke throughout interface processing. As the result of such a keyboard timeout:

1) The user shall be automatically logged out, and:

2) Control shall be returned to the log on procedure (Operational State) or the automatic control function (Initialization State).

4) Select Output Device.

(b) System Configuration Control

5) Adaptive Environment Data Configuration.

6) Modify Adaptive Environmental data.

7) Adaptive Parameter Data Configuration.

8) Modify Adaptive Parameter data.

(c) Security Control

9) Maintain usernames and passwords.

(d) Archival Data Control

10) Maintain/display SAO-formatted archival data.

(e) System Event Log Control

11) Maintain/display ADAS event log data.

12) Maintain/display ADAS error log data.

(f) Maintenance Control

13) Enable/disable Maintenance data points.

14) Reset Maintenance data points.

15) Display Maintenance data point values/status.

16) Enter/display ADAS Maintenance log data.

(g) Test Data Control

17) Control LDD test message.

18) Control MPS test message.

19) Control AWOS test message.

(h) Communications and Equipment Status Display

20) Display status of A interfaces.

4) Select Output Device.

(b) System Configuration Control

5) Adaptive Environment Data Configuration.

6) Modify Adaptive Environmental data.

7) Adaptive Parameter Data Configuration.

8) Modify Adaptive Parameter data.

(c) Security Control

9) Maintain usernames and passwords.

(d) Archival Data Control

10) Maintain/display SAO-formatted archival data.

(e) System Event Log Control

11) Maintain/display ADAS event log data.

12) Maintain/display ADAS error log data.

(f) Maintenance Control

13) Enable/disable Maintenance data points.

14) Reset Maintenance data points.

15) Display Maintenance data point values/status.

16) Enter/display ADAS Maintenance log data.

(g) Test Data Control

17) Control LDD test message.

18) Control MPS test message.

19) Control AWOS test message.

(h) Communications and Equipment Status Display

20) Display status of A interfaces.

(b) Additional options shall include at least the systemprinter.

(c) When set by the specialist, thedevice selection shall remain in effect until changed or reinitialized.

3.1.4.3.2.2.2 System configuration control. The ADAS shall provide for the definition of system configuration. These commands allow the ADAS specialist to enter or modify adaptive data.

3.1.4.3.2.2.2.1 Adaptive environment data.

3.1.4.3.2.2.2.1.1 Adaptive environment data definition. This data shall consist of all ADAS adaptation and configuration data in principle unique to a given ADAS installation. An ADAS specialist shall have the capability to modify the described parameters in volatile storage during the current ADAS operational session (cf 3.1.4.3.2.2.2.1.3), including at least the following:

(a) Communications adaptation data: Configuration data specific to required ADAS external interfaces describing the identity of communicating nodes and operating parameters associated with each communicationsinterface, including product delivery schedules where appropriate. Required maintenance susbsystem data point class membership shall be derived from this data.

(b) AWOS site adaptation data: For each configured site within (a), site identifier and type codes, SAO message production status, latitude, longitude, local landing minima and other local critical weather adaptation data.

(c) ADAS site adaptation data: Datarelated specifically to ADAS/ACF.

3.1.4.3.2.2.2.1.2 Adaptive environment data configuration. The ADAS shall provide the capability for the specialist to define, display, and modify the environmental parameters specific to a given ADAS installation.

(a) This capability shall include definition of new circuits (both physical circuits and NADIN PSN virtual circuits), deletion of existing circuits, and modification of existing circuits.

(b) The specialist shall have the capability to view, enter, modify and delete any or all data as appropriate.

(c) The ADAS shall automatically detect the failure of this data (nonexistence,corruption, incompleteness) during the Initialization State, and may not proceed with initialization or enter the Operational State while such a failure status obtains.

3.1.4.3.2.2.2.1.3 Adaptive environmental data modification. The ADAS shall provide commands to modify ADAS adaptive environmental data on a temporary basis.

(a) Such modifications shall not be permanently recorded, and shall be effective for the current ADAS execution session only.

(b) These commands shall permit the specialist to control the operational status of each system interface. An interface may be set to deconfigured or reconfigured status.

(c) This function shall permit the manual override of the automatic determination of a circuit status. The transition from operational to nonoperational status shall permit the completion of link, network, and transport layer procedures on the circuit.

(d) The specialist shall have the capability to view and perform temporary modifications (enter, change, and/or delete) to any or all data as appropriate.

(e) Design shall ensure that execution of specified modifications shall not interfere with normal ADAS mission processing during the Operational State.

3.1.4.3.2.2.2.2 Adaptive parameter data.

3.1.4.3.2.2.2.2.1 Adaptive parameter data definition. This data shall consist of all ADAS adaptation and configuration data in principle identical for any and all ADAS installations. An ADAS specialist shall have the capability to modify the described parameters on a temporary basis during the current ADAS operational session (cf 3.1.4.3.2.2.2.2.3), including at least the following:

(a) Processing schedule and timing parameters.

(b) Storage sizing and queue blocking parameters.

(c) Data aging and processing timeout parameters.

(d) Critical weather detection parameters and thresholds used for all AWOS sites.

(e) Maintenance subsystem data point alarm thresholds and processing parameters.

Parameters required for operation of the specialist interface control function shall have nominal defaults within ADAS software.

3.1.4.3.2.2.2.2.2 Adaptive parameter data configuration. The ADAS shall provide the capability for the specialist to define, display, and modify the control and processing parameters generic to all ADAS installations.

(a) The specialist shall have the capability to view, enter, modify, and delete any or all data as appropriate.

(b) The ADAS shall automatically detect the failure of this data (nonexistence, corruption, incompleteness) during the Initialization State, and may not proceed with initialization or enter the Operational State while such a failure status obtains.

3.1.4.3.2.2.2.2.3 Adaptive parameter data modification. The ADAS shall provide commands to modify adaptive parameter data on a temporary basis.

(a) Such modifications shall& be permanently recorded, and shall be effective for the current ADAS execution session only, or until further modifications are effected.

(b) The specialist shall have the capability to view and perform temporary modifications (enter, change, and/or delete) to any or all data as appropriate.

(c) Design shall ensure that execution of specified changes shall not interfere with normal ADAS mission processing during the Operational State.

3.1.4.3.2.2.3 Username/Password control. The ADAS shall provide commands to display, add, delete, or modify ADAS user/password securitydata.

(a) This command capability shall be restricted to a system manager by security procedures (cf 3.1.4.3.2.1.3).

(b) Prior to the creation of any local personnel authorizations by a system manager, securitydata shall consist only of a standardized username for a manager, with an associated nominal and modifiable password.

(c) A manager shall have the capability to view, enter, modify, and delete any or all usernames and passwords as appropriate, with the constraint that the manager shall never be deleted as a user (the manager's password shall be modifiable).

(c) The ADAS shall automatically detect the failure of this data (nonexistence, corruption, incompleteness) during the Initialization State, and may not proceed with initialization or enter the Operational State while such a failure status obtains.

3.1.4.3.2.2.2.2.2 Adaptive parameter data configuration. The ADAS shall provide the capability for the specialist to define, display, and modify the control and processing parameters generic to all ADAS installations.

(a) The specialist shall have the capability to view, enter, modify, and delete any or all data as appropriate.

(b) The ADAS shall automatically detect the failure of this data (nonexistence, corruption, incompleteness) during the Initialization State, and may not proceed with initialization or enter the Operational State while such a failure status obtains.

3.1.4.3.2.2.2.2.3 Adaptive parameter data modification. The ADAS shall provide commands to modify adaptive parameter data on a temporary basis.

(a) Such modifications shall& be permanently recorded, and shall be effective for the current ADAS execution session only, or until further modifications are effected.

(b) The specialist shall have the capability to view and perform temporary modifications (enter, change, and/or delete) to any or all data as appropriate.

(c) Design shall ensure that execution of specified changes shall not interfere with normal ADAS mission processing during the Operational State.

3.1.4.3.2.2.3 Username/Password control. The ADAS shall provide commands to display, add, delete, or modify ADAS user/password securitydata.

(a) This command capability shall be restricted to a system manager by security procedures (cf 3.1.4.3.2.1.3).

(b) Prior to the creation of any local personnel authorizations by a system manager, securitydata shall consist only of a standardized username for a manager, with an associated nominal and modifiable password.

(c) A manager shall have the capability to view, enter, modify, and delete any or all usernames and passwords as appropriate, with the constraint that the manager shall never be deleted as a user (the manager's password shall be modifiable).

(c) The ADAS shall automatically detect the failure of this data (nonexistence, corruption, incompleteness) during the Initialization State, and may not proceed with initialization or enter the Operational State while such a failure status obtains.

parameters and any or all existing data, backup logs to movable nonvolatile storage, and initialize the error log system.

(d) Initialization of the error log system shall be destructive and require double confirmation.

(e) Log control features shall not interfere with the automatic performance of error logging.

3.1.4.3.2.2.6 Maintenance control. The ADAS shall provide for the performance of Maintenance-related control activities by the AIMS specialist.

3.1.4.3.2.2.6.1 Enable/disable Maintenance data mints.

(a) The ADAS shall provide commands that will permit enabling or disablingofany or all Maintenance data point alarm capabilities.

(b) Data point alarm enable/disable shall be available individually, by logical unit, or collectively.

3.1.4.3.2.2.6.2 Reset Maintenance data points.

(a) The ADAS shall provide commands that will permit the reset of any or all Maintenance data point data.

(b) Data point reset shall be available individually, by logical unit, or collectively.

(c) Reset of any data point shall clear the current data point value and alarm status to initialization values, with associated reset time-stamping.

(d) If a reset data point is currently alarmed, reset shall cause a return-to-normal alarm message to be formatted (cf NAS-IR-51030002) and enqueued to the MPS output component of the Communications function.

3.1.4.3.2.2.6.3 Maintenance data mint display. The ADAS shall provide commands to permit the display of the current data associated with Maintenance data points.

(a) Data display shall be available by individual data point, by logical unit, or collectively.

(b) For any data point, data displayed shall include current data point value, alarmthresholds, current and past alarm status, alarmenable status, and time of last reset.

3.1.4.3.2.2.6.4 Maintenance data control. The ADAS shall provide commands to permit a specialist to enter maintenance data records (cf 3.1.4.2.2), recording specialist activities related to preventive and corrective maintenance, certification procedures, etc.

(a) Prompting shall guide the user through the set of allowable maintenance data entries.

(b) Maintenance data formatting procedures shall be performed automatically, including entry time/date stamping (cf NAS-IR-51030002).

(c) Additional commands shall support the display of all or any portion of the maintenance data report.

(d) The ADAS shall provide thecapability for specifying a time range or record type for display.

(e) The specialist shall have the capability to view both maintenance data status parameters and any or all existing data, backup maintenance data to movable nonvolatile storage, and initialize the maintenance data system.

(f) Initialization of the maintenance data system shall be destructive and require double confirmation.

3.1.4.3.2.2.7 Interface test messages. The ADAS shall provide commands to permit a specialist to formulate and enqueue test messages for specific external interfaces.

3.1.4.3.2.2.7.1 LDD test messages. The ADAS shall provide commands to permit a specialist toformulate and enqueue an LDD test message to the AWOS output component of the Communications Function.

3.1.4.3.2.2.7.2 MPS test messages. The ADAS shall provide commands to permit a specialist to formulate and enqueue an MPS test message to the MPS output component of the Communications Function.

3.1.4.3.2.2.7.3 AWOS test messages. The ADAS shall provide commands to permit a specialist to formulate and enqueue an AWOS test message to the AWOS output component of the Communications Function.

3.1.4.3.2.2.8 Communications and equipment status display. The ADAS shall provide commands to permit the display of the current status of all nominally configured system macrostates and microstates (cf 3.1.3.2).

(a) Status shall include reports for all nominal interfaces, whether or not session-deconfigured (cf 3.1.4.3.2.2.2.1.3).

(b) Status registers shall be displayable collectively, by category, or individually.

3.1.4.3.3 Performance requirements.

3.1.4.3.3.1 Processing performance requirements. All components of ADAS processing initiated as part of the one-minute mission cycle shall be completed within that minute.

3.1.4.3.3.1.1 Weather message processing. Each configured AWOS site shall be polled for current weather messages once per minute during the ADAS Operational State.

3.1.4.3.3.1.1.1 Weather message processing intervals. Weather message processing shall be performed at the following intervals:

(a) All AWOS format weather messages shall be disseminated each minute to the collocated RWP and WCP.

(b) SAO format SA and RS messages, whether received from AWOS sites or generated by ADAS, shall be disseminated to the WMSCR hourly on a statically configurable minute within the hour.

(c) SAO format SP and USP messages, whether received from AWOS sites or generated by ADAS, shall be disseminated to the WMSCR as they are produced.

(d) All SAO format messages shall be archived as they are produced for a period of up to 15 days.

(e) During an interrupt in the WMSCR/ADAS communication link, all SAO format messages shall be enqueued for a period of 3 hours.

1) On restoration of the link, enqueued data shall be dequeued on a last-in/first-out priority basis in the order USP, SP/RS, and SA, and forwarded to the WMSCR.

2) Processing of current SAO messages shall take priority over dequeueing of old SAO messages.

(f) LDD data shall be disseminated to AWOS sites each minute.

3.1.4.3.3.1.1.2 Weather message processing throughput. Processing of input weather messages for forwarding to NAS User (WMSCR, RWP, and WCP) output interface components shall be constrained as follows:

(a) Timing constraints:

(b) Status registers shall be displayable collectively, by category, or individually.

3.1.4.3.3 Performance requirements.

3.1.4.3.3.1 Processing performance requirements. All components of ADAS processing initiated as part of the one-minute mission cycle shall be completed within that minute.

3.1.4.3.3.1.1 Weather message processing. Each configured AWOS site shall be polled for current weather messages once per minute during the ADAS Operational State.

3.1.4.3.3.1.1.1 Weather message processing intervals. Weather message processing shall be performed at the following intervals:

(a) All AWOS format weather messages shall be disseminated each minute to the collocated RWP and WCP.

(b) SAO format SA and RS messages, whether received from AWOS sites or generated by ADAS, shall be disseminated to the WMSCR hourly on a statically configurable minute within the hour.

(c) SAO format SP and USP messages, whether received from AWOS sites or generated by ADAS, shall be disseminated to the WMSCR as they are produced.

(d) All SAO format messages shall be archived as they are produced for a period of up to 15 days.

(e) During an interrupt in the WMSCR/ADAS communication link, all SAO format messages shall be enqueued for a period of 3 hours.

1) On restoration of the link, enqueued data shall be dequeued on a last-in/first-out priority basis in the order USP, SP/RS, and SA, and forwarded to the WMSCR.

2) Processing of current SAO messages shall take priority over dequeueing of old SAO messages.

(f) LDD data shall be disseminated to AWOS sites each minute.

3.1.4.3.3.1.1.2 Weather message processing throughput. Processing of input weather messages for forwarding to NAS User (WMSCR, RWP, and WCP) output interface components shall be constrained as follows:

(a) Timing constraints:

(c) For commands identified in the design as "intrusive" (cf 3.1.4.3.2.1.1): less than 30 seconds, 50 percent of the time, and less than one minute, 95 percent of the time.

3.1.4.3.3.3 Communications performance requirements. Performance requirements for ADAS external interfaces shall be as specified in the relevant ADAS ICDs.

3.1.5 ADAS functional flow diagram. Refer to Figure 2.

3.1.6 Configuration allocation. To be specified by system design activity.

3.1.7 Interface requirements.

3.1.7.1 External interfaces.

3.1.7.1.1 External systems description. The ADAS receives data from or sends data to a variety of external sources. The ADAS interface with each of the external systems shall be in compliance with the requirements set forth in the respective IRD. A list of all external systemsinterfacing with the ADAS is given below with reference to the respective Interface Requirement Documents.

(a) CTS NAS-IR-92020000

(b) LCN NAS-IR-21020000

(c) RWP NAS-IR-25082501

(d) MPS/Automation Subsystems NAS-IR-51030002

(e) WMSCR NAS-IR-25082507

(f) WCP NAS-IR-25082503

(g) AWOS NAS-IC-25083101-01

(h) TE/Digital Interface NAS-IR-44010001

(i) NADIN Packet Mode Users X.25 . . . . . NAS-IR-43020001

3.1.7.1.2 External interface identification. A staged implementation of the National Airspace System (NAS) is scheduled to occur between 1984 and 1995. ADAS, scheduled for operation in the early 1990s, will be in service during the evolution of NAS. ADAS is presumed to operate in two distinct stages: Transition State, and End State.

3.1.7.1.2.1 Transition State. The Transition State shall be characterized by the implementation of:

(a) Federal andnonfederal AWOS

(b) NWS ASOS

(c) DOD AOS

(d) NADIN PSN

(e) WMSCR

(f) RWP

(g) MPS

(h) WCP

(i) CTS.

During the Transition State, the Local Communications Network (LCN) is not in service: in its place, communication by all NAS end processors of ADAS output -- whether collocated at the ACF (RWP, WCP and MPS) or external to the ACF (WMSCR) -- shall be performed using the NADIN PSN.

Figure 6 shows the ADAS external processor interfaces anticipated during the Transition State. As indicated, ADAS has six direct and three indirect interfaces. Direct interfaces shall be with CTS, AWOS, ASOS, AOS, NADIN, and MPS. Indirect interfaces with RWP, WCP, and WMSCR shall be implemented via NADIN.

3.1.7.1.2.2 End State. 'The End State is characterized by the implementation of the NAS LCN at each ACF. The LCN shall link ADAS to processors collocated in the ACFs, and serve as the gateway to the NADIN PSN. Figure 7 shows the external processor interfaces to ADAS in the End State.

3.1.7.1.3 Hardware-to-hardware externalinterfaces. ADAS shall have four external hardware interfaces:

(a) TE/ADAS

(b) NADIN PSN/ADAS

(c) LCN Interface Unit/ADAS

(d) CTS/ADAS.

3.1.7.1.2.1 Transition State. The Transition State shall be characterized by the implementation of:

(a) Federal andnonfederal AWOS

(b) NWS ASOS

(c) DOD AOS

(d) NADIN PSN

(e) WMSCR

(f) RWP

(g) MPS

(h) WCP

(i) CTS.

During the Transition State, the Local Communications Network (LCN) is not in service: in its place, communication by all NAS end processors of ADAS output -- whether collocated at the ACF (RWP, WCP and MPS) or external to the ACF (WMSCR) -- shall be performed using the NADIN PSN.

Figure 6 shows the ADAS external processor interfaces anticipated during the Transition State. As indicated, ADAS has six direct and three indirect interfaces. Direct interfaces shall be with CTS, AWOS, ASOS, AOS, NADIN, and MPS. Indirect interfaces with RWP, WCP, and WMSCR shall be implemented via NADIN.

3.1.7.1.2.2 End State. 'The End State is characterized by the implementation of the NAS LCN at each ACF. The LCN shall link ADAS to processors collocated in the ACFs, and serve as the gateway to the NADIN PSN. Figure 7 shows the external processor interfaces to ADAS in the End State.

3.1.7.1.3 Hardware-to-hardware externalinterfaces. ADAS shall have four external hardware interfaces:

(a) TE/ADAS

(b) NADIN PSN/ADAS

(c) LCN Interface Unit/ADAS

(d) CTS/ADAS.

Figure 7. ADAS Topology End State External Interface

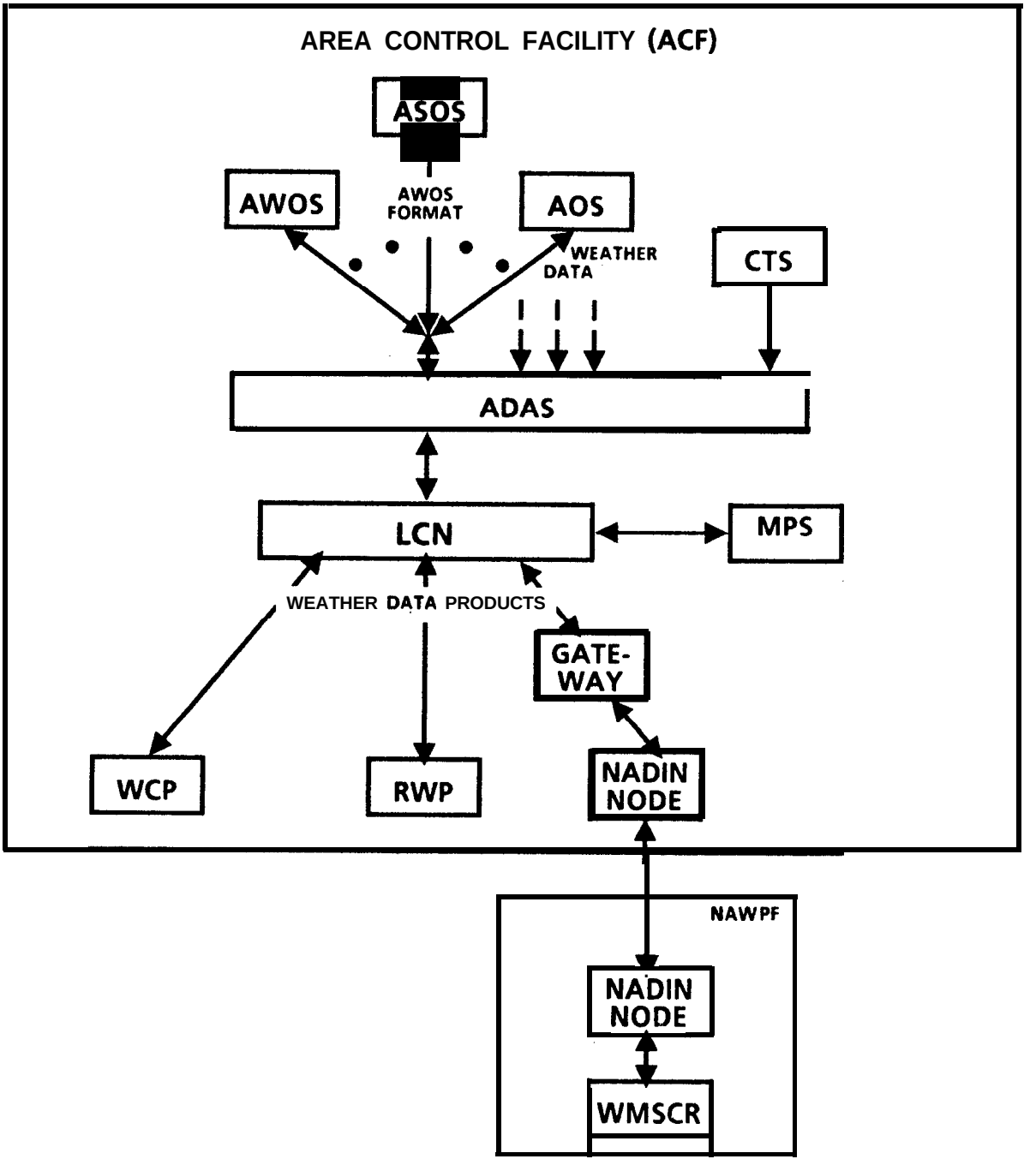
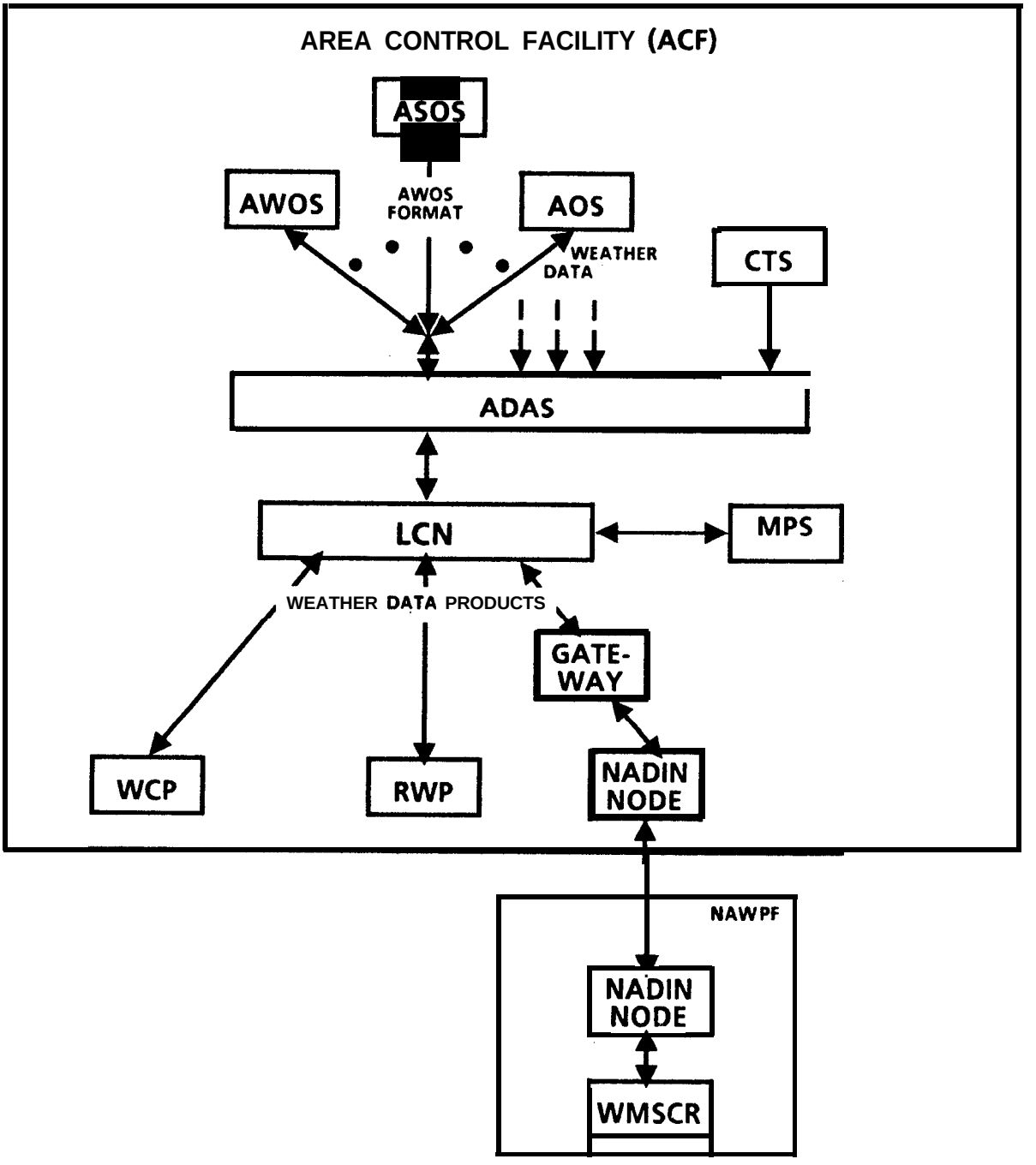


Figure 7. ADAS Topology End State External Interface



unloading, and setting into position for installation shall not cause damage to any ADAS component nor deformation to the equipment units.

3.2.1.5 Power requirements. The ADAS shall operate on one or both of the FAA-supplied electrical power services available within the host facility. The power consists of 115 volts ±5 percent, 60 Hz ±2 percent, single-phase three-wire service. Power shall be furnished to the ADAS through individual circuit breakers. Further distribution and protection against fluctuations and overload shall be designed within the ADAS in accordance with NEC-NFPA-70 where FAA-C-1217 does not apply. ADAS power distribution requirements shall be:

(a) Each equipment unit shall be provided with a single circuit breaker for supply-power overload protection, as well as a visible circuit-breaker indicator.

(b) Each equipment unit shall provide for the distribution of electrical power within the unit.

(c) All circuit breakers shall be provided with a mechanical shield to prevent accidental tripping.

(d) Design of the ADAS shall be such that the removal of power from any component cannot damage any other component.

3.2.1.6 Electrical grounding/interfacing.

3.2.1.6.1 Grounding and bonding. The ADAS system grounding and bonding shall be in accordance with FAA-STD-020. ADAS grounding and bonding shall be compatible with that of other equipment interfacing with the ADAS.

3.2.1.6.2 Electrostatic discharge (ESD). AIMS equipment accessible by users shall be immune to ESD from personnel bearing a static charge.

3.2.1.7 Wire and cabling. All ADAS equipment wires, cabling layout, and routing shall be in accordance with FAA-STD-020 and the applicable portions of NEC-NFPA-70.

3.2.1.8 Cooling.

3.2.1.8.1 Internal temperature. The internal temperature of an operating ADAS shall stay within the operating limits of all ADAS components without requiring special cooling equipment other than forced-air cooling using room temperature air.

3.2.1.8.2 Airflow. Mounted ADAS equipment shall be arranged so that natural-and-forced-convection airflow is optimized.

3.2.1.9 Security. There shall be no physical security devices required on ADAS equipment beyond normal ACF access.

3.2.2 Environmental conditions. The ADAS shall be designed to comply with the following environmental conditions that may be encountered during the transportation, storage, and operation of the system.

3.2.2.1 Natural environment. The ADAS shall be designed for the operating and nonoperating environmental conditions listed in Table 1. Specification requirements for operating under service conditions shall be met when the equipment is operating at the specified duty cycle. Operating service conditions apply under all fixed or slowly varying conditions of AC line voltage and frequency defined in FAA-G-2100. Nonoperating conditions include shipping and handling, storage, and installations that are not operating. If the equipment is designed to the nonoperating condition, thendesign verification test results equal to or beyond these conditions shall be available; if not, then protective containers and/or an environmental control system shall be provided so the stated nonoperating condition is not experienced by the equipment.

3.2.2.2 Induced environment. The shock design requirements needed to withstandthe commercial carrier transportation requirements shall be in accordance with MIL-STD-810.

3.2.3 Nuclear control requirement. ADAS has no special requirements for nuclear control, other than those imposed by host facility requirements.

3.2.4 Materials, processes, and parts. Procedures shall exist for the ADAS off-the-shelf designs to manage corrosion, dissimilar metals, and noxious materials.

3.2.4.1 Corrosion. Corrison control and monitoring shall be in accordance with MIL-HDBK-721.

3.2.4.2 Dissimilar metals. Dissimilarmetals shall not be used where their use will degrade or cause deterioration to the assembled parts. When dissimilarmetalsare used,they shall be coated or protected to prevent degradation to other parts andassemblies. For ADAS development, MIL-STD-889, Dissimilar Metals, shall be followed.

3.2.4.3 Noxious materials. ADAS hardware shall not consist of materials that arenutrients for fungi where it is practical to avoid them. Suchmaterials shall be protected against moisture and fungus with a fungus-resistent varnish in accordance with FAA-G-2100.

3.2.5 Electromagnetic interference requirements. The ADAS equipment shall meet the conducted and radiated emissions requirementsof FCC Rules and

3.2.1.9 Security. There shall be no physical security devices required on ADAS equipment beyond normal ACF access.

3.2.2 Environmental conditions. The ADAS shall be designed to comply with the following environmental conditions that may be encountered during the transportation, storage, and operation of the system.

3.2.2.1 Natural environment. The ADAS shall be designed for the operating and nonoperating environmental conditions listed in Table 1. Specification requirements for operating under service conditions shall be met when the equipment is operating at the specified duty cycle. Operating service conditions apply under all fixed or slowly varying conditions of AC line voltage and frequency defined in FAA-G-2100. Nonoperating conditions include shipping and handling, storage, and installations that are not operating. If the equipment is designed to the nonoperating condition, thendesign verification test results equal to or beyond these conditions shall be available; if not, then protective containers and/or an environmental control system shall be provided so the stated nonoperating condition is not experienced by the equipment.

3.2.2.2 Induced environment. The shock design requirements needed to withstandthe commercial carrier transportation requirements shall be in accordance with MIL-STD-810.

3.2.3 Nuclear control requirement. ADAS has no special requirements for nuclear control, other than those imposed by host facility requirements.

3.2.4 Materials, processes, and parts. Procedures shall exist for the ADAS off-the-shelf designs to manage corrosion, dissimilar metals, and noxious materials.

3.2.4.1 Corrosion. Corrison control and monitoring shall be in accordance with MIL-HDBK-721.

3.2.4.2 Dissimilar metals. Dissimilarmetals shall not be used where their use will degrade or cause deterioration to the assembled parts. When dissimilarmetalsare used,they shall be coated or protected to prevent degradation to other parts and assemblies. For ADAS development, MIL-STD-889, Dissimilar Metals, shall be followed.

3.2.4.3 Noxious materials. ADAS hardware shall not consist of materials that arenutrients for fungi where it is practical to avoid them. Suchmaterials shall be protected against moisture and fungus with a fungus-resistent varnish in accordance with FAA-G-2100.

3.2.5 Electromagnetic interference requirements. The ADAS equipment shall meet the conducted and radiated emissions requirements of FCC Rules and

Table 1. The ADAS Environment

Environment	Equipment Operating	Equipment Non-operating
Altitude (ft.)	0 to 8,000	0 to 50,000
Temperature Range (^{o}C)	+10^{o} to +40^{o}	-50^{o} to +70^{o}
Humidity, % RH	10% to 80%	Up to 100% RH, non-condensing

3.3.1.2.2 Cm-muter memory utilization.' Main memory shall be expandable by 50% or more along with the ability to add additional channels to support new peripheralsand communications interfaces. This may be achieved by reconfiguring equipment in a larger chassis providing the same backplane.

3.3.2 Software requirements. This section specifies requirements to which the proposed ADAS system software must adhere. Thedeliverable software shall include all those program development capabilities, features, and facilities used to develop ADAS custom application software. ADAS operational systems in the field, however, shall not be equipped for software development.

3.3.2.1 Diagnostic software. ADAS shall use diagnostic software suitable for the host computer system. This software shall isolate a hardware failure to the LRU level. Diagnostics for all provided equipment and peripherals shall be furnished. Diagnostic results shall be displayed on the ASC and/or as hardcopyoutput.

3.3.2.2 Custom application software. The-development of ADAS custom software shall adhere to the following requirements for programming languages and developmentalsupport software.

3.3.2.2.1 Development tools. Tools designed to aid in the software requirements, design and development phases shall be supplied (cf 3.3.3.2).

3.3.2.2.2 Programming languages. All software specifically developed for ADAS shall be implemented in a single, high order language with structured attributes consistent with the requirements in 3.3.3.

3.3.2.2.3 Program library maintenance system. A program library maintenance system shall be provided to organize and maintain source codes (cf 3.3.3.2.3).

3.3.2.2.4 Compilers/assemblers. A compiler capable of compiling the programs written in the high order language shall be used for the implementation of the ADAS software.

3.3.2.2.5 Debugger. Asymbolic interactivedebugger for use insoftware testing that is suitable for the provided compiler shall be furnished.

3.3.3 Design and coding constraints. This section specifies the software design and coding constraints under which the custom-designed software shall be designed and implemented, and design constraints to which supplied (non-custom) software must adhere.

3.3.3.1 Supplied software design constraints. Supplied software shall accommodate the following requirements:.

3.3.1.2.2 Cm-muter memory utilization.' Main memory shall be expandable by 50% or more along with the ability to add additional channels to support new peripheralsand communications interfaces. This may be achieved by reconfiguring equipment in a larger chassis providing the same backplane.

3.3.2 Software requirements. This section specifies requirements to which the proposed ADAS system software must adhere. Thedeliverable software shall include all those program development capabilities, features, and facilities used to develop ADAS custom application software. ADAS operational systems in the field, however, shall not be equipped for software development.

3.3.2.1 Diagnostic software. ADAS shall use diagnostic software suitable for the host computer system. This software shall isolate a hardware failure to the LRU level. Diagnostics for all provided equipment and peripherals shall be furnished. Diagnostic results shall be displayed on the ASC and/or as hardcopyoutput.

3.3.2.2 Custom application software. The-development of ADAS custom software shall adhere to the following requirements for programming languages and developmentalsupport software.

3.3.2.2.1 Development tools. Tools designed to aid in the software requirements, design and development phases shall be supplied (cf 3.3.3.2).

3.3.2.2.2 Programming languages. All software specifically developed for ADAS shall be implemented in a single, high order language with structured attributes consistent with the requirements in 3.3.3.

3.3.2.2.3 Program library maintenance system. A program library maintenance system shall be provided to organize and maintain source codes (cf 3.3.3.2.3).

3.3.2.2.4 Compilers/assemblers. A compiler capable of compiling the programs written in the high order language shall be used for the implementation of the ADAS software.

3.3.2.2.5 Debugger. Asymbolic interactivedebugger for use insoftware testing that is suitable for the provided compiler shall be furnished.

3.3.3 Design and coding constraints. This section specifies the software design and coding constraints under which the custom-designed software shall be designed and implemented, and design constraints to which supplied (non-custom) software must adhere.

3.3.3.1 Supplied software design constraints. Supplied software shall accommodate the following requirements:.

(c) Ensure that the system is initialized to a correct, internally defined, and operationally ready state upon recovery from a fault and that all processing interrupted by a fault is properly resumed after recovery.

(d) Incorporate the supplied operating system that is applicable to the processing elements and consistent with the selected design and architecture.

3.3.3.2.3 Special design tools and techniques. Design support tools shall be used to record, analyze, and maintain the ADAS software design. These tools shall provide:

(a) Traceability of software system components to software requirements.

(b) Configuration control and tracking of changes in the design and software requirements.

(c) Completeness and consistency testing of all software units.

(d) Modeling and simulation to support processing resource allocations and to predict system performance under varying work loads, as required.

(e) The means to verify adherence of the design to software design standards.

(f) The means to indicate in the design representation that a design feature is incomplete and, later, to identify and track all such incomplete design features.

(g) Various printed reports such as source listings, error lists, cross-reference lists, flow charts, hierarchy charts, design change history logs, extensive external code documentation manuals (organized for flexible and precise reference), and any other documentation required to validate the ADAS program design.

The tools shall be applicable throughout the software development and maintenance life cycle. They shall address all aspects of operational software design, including data structures, files, and interfaces. The tools shall encourage and facilitate design of software in accordance with the contractor-supplied Software Quality Assurance Plan.

3.3.3.2.4 Design representation. The design shall be represented in a manner that facilitates traceability to the specification, ease of understanding, and ease of design implementation. The representation shall be maintained as part of the design data base. The ADAS design representation shall:

(a) Provide a natural expression of the control constructs specified for code development.

(b) Be compatible with the properties and facilities of the target language candidates and their automated tool implementations.

(c) Facilitate a precise specification of the design and impose a rigorous structure on the design.

(d) Be directly processable by tools (cf 3.3.3.2.3) to facilitate the analysis provisions noted and to enable standards enforcement to be accomplished.

(e) Explicitly document design decisions with high-order design not affected by low-level implementation.

(f) Be expressed in such a way that programmers receive only that information needed to complete a unit and users receive only that information needed to use a unit.

(g) Provide formal, testable unit specifications with design decisions decoupled and encapsulated, interfaces explicitly defined, and complete documentation of dependencies.

3.3.3.2.5 Design unit attributes. Modular design shall be utilized to facilitate expansion, modification, and configuration control, and to enhance reliability. The ADAS software design or software architecture shall meet the following modularity requirements:

(a) Each design unit shall perform a single unique function, with inputs, outputs, and intermodular interfaces clearly defined.

(b) Each unit shall be separately compilable.

(c) Each unit shall consist of a specification part, data declarations, and sequence of statements. The specification part shall contain the information necessary to use the unit. The data declarations shall define logical entities needed by the module. The sequence of statements shall define operations to be performed.

(d) Only statements within a unit shall access private data-types of that unit. Other units shall access data through interfaces provided by this unit.

3.3.3.2.6 Unit attributes. Structured programming techniques shall be employed. All program units shall meet the following additional requirements:

(a) A program unit shall contain the code required to implement a single, well-defined function and shall consist of not more than 100 executable, high-order language statements.

(b) All source code shall be indented to clearly denote logical levels of constructs for ease of visual inspection.

(c) All segments shall have sufficient annotation, i.e., comments, to explain inputs, outputs, branches, and other items not obvious in the code itself. Explanatory notes shall be uniformly indented.

(d) Statements shall be grouped and arranged in a meaningful order in the code, e.g., columnar rather than a horizontal string.

(e) Data declarations shall be grouped and arranged in a meaningful order in the code, e.g., columnar rather than a horizontal string.

(f) Data names and procedure labels shall be meaningful in that labels shall be suggestive of their function.

(g) Each line of source code shall contain one statement only.

(h) Formats for error and diagnostic messages shall be standardized and shall require no additional interpretation such as table lookups.

(i) Loop indexes shall not be altered during loop execution.

(j) Unnecessary assignment of a constant value to a variable (especially within a loop) shall not be made.

(k) Code shall be written so that no code can be modified during execution.

(l) Units shall not share temporary storage locations ofvariables.

(m) Each unit shall be uniquely identified.

(n) Except for error exits, each unit shall have a single entry point and a single exit point.

(o) Complicatedexpressions, such ascompounded negativeBoolean expressions and nesting beyond three levels, shall not be used.

3.3.4 use of commercial and reusable software. The use of any commercially procured software or software developed for other applications (reusable software) shall be confined to that which has been demonstrated to meet the performance criteria, reliability, maintainability, availability, testing, and

(a) A program unit shall contain the code required to implement a single, well-defined function and shall consist of not more than 100 executable, high-order language statements.

(b) All source code shall be indented to clearly denote logical levels of constructs for ease of visual inspection.

(c) All segments shall have sufficient annotation, i.e., comments, to explain inputs, outputs, branches, and other items not obvious in the code itself. Explanatory notes shall be uniformly indented.

(d) Statements shall be grouped and arranged in a meaningful order in the code, e.g., columnar rather than a horizontal string.

(e) Data declarations shall be grouped and arranged in a meaningful order in the code, e.g., columnar rather than a horizontal string.

(f) Data names and procedure labels shall be meaningful in that labels shall be suggestive of their function.

(g) Each line of source code shall contain one statement only.

(h) Formats for error and diagnostic messages shall be standardized and shall require no additional interpretation such as table lookups.

(i) Loop indexes shall not be altered during loop execution.

(j) Unnecessary assignment of a constant value to a variable (especially within a loop) shall not be made.

(k) Code shall be written so that no code can be modified during execution.

(l) Units shall not share temporary storage locations ofvariables.

(m) Each unit shall be uniquely identified.

(n) Except for error exits, each unit shall have a single entry point and a single exit point.

(o) Complicatedexpressions, such ascompounded negativeBoolean expressions and nesting beyond three levels, shall not be used.

3.3.4 use of commercial and reusable software. The use of any commercially procured software or software developed for other applications (reusable software) shall be confined to that which has been demonstrated to meet the performance criteria, reliability, maintainability, availability, testing, and

capabilities in the form of built-in test equipment/built-in test (BITE/BIT) and/or external test equipment utilizing test points, such that 85 percent of all failure occurrences can be isolated to the single faulty LRU, and 95 percent to no more than two LRUs. On-site ADAS preventive maintenance tasks shall be required no more than once every 90 days (cf FAA Order 6000.30).

3.4.2.2 Design constraints.

3.4.2.2.1 Service and access. For all ADAS equipment, design for ease of servicing and access shall be in accordance with paragraphs 5.9, 5.10, 5.11, and 5.13 of MIL-STD-1472. All major components (equipment) or modules shall be completely removable from their enclosure with minimum feasible disassembly. Ail test points shall be accessible without disassembly of the equipment. The equipment shallbe designed to permit modulereplacement without removal of adjacent modules. Calibrations and adjustments shall be accomplished through the use of either built-in meters and gauges or portable test instruments. When safety allows, access shall be provided to modules from outside the basic equipment through the use of swing-out units, pull-out drawers with drawer slides, cable extenders and cable retractors, and circuit-card extenders, to allow module operation in the open position. The variety and number of special tools and test equipment to maintain the equipment shall be held to a minimum.

3.4.2.2.2 Test points. All ADAS equipment not covered by built-in test equipment or testable by diagnostic software shall provide test points and facilities for connecting external test equipment for determining performance quality of the equipment. Test points shall be in accordance with MIL-STD-415.

3.4.2.3 Modularity. All equipment shall be designed to be modular, and the number of unique module types shall be kept to a minimum. Plug-in modules shall be standardized to permit interchangeability of similar nodules without alignment or adjustment. All modules shall be keyed to prevent incorrect installation and/or incorrect interconnection.

3.4.2.4 Monitoring requirements. The ADAS shall have both automated self-monitoring capabilities and specialist-initiated monitoring capabilities. ADAS shall automatically and constantly evaluate the operational status of each hardware component and each software element corresponding to the major system functions. Any critical alarm shall be reported to the specialist via the system event log function and to the MPS via the ADAS/MPS interface. The status of any hardware element and the status of any software element shall be displayed on the ASC within 3 seconds following a specialist request.

3.4.3 Modifiability. ADAS shall provide hardware modifiability in two major areas: processor configuration and communications configuration. Processor expansion shall be achieved by replacing (if and when necessary) one main processor with another of the same or upward-compatible type, or by replacing

memory or other peripheral equipment with expanded compatible equipment. Communications configuration expansion shall be achieved by adding communications front-end processors to the system configuration. These two goals are met most easily in standard bus microcomputer architectures, and ADAS is expected to be based on such a bus standard.

Field modification and expansion within the limits of the maximum ADAS configuration shall be possible. In addition, a sufficient quantity of spare components crucial to the operation of ADAS shall be accessible to achieve compliance with the ADAS MTTR requirement.

Software flexibility, modularity, and decoupling shall be provided by two factors: the use of a high order programming language and the use of a standard microcomputer operating system (cf 3.3.2.2.1).

ADAS shall provide processor capacity available for future software expansion without reconfiguration (cf 3.3.1.2).

3.4.4 Availability. Availability shall be defined as the probability that a ADAS node will be in a state capable of meeting its functional requirements when it is called upon at a random time, exclusive of the effects of any logistics or administrative delays. It is affected by failure rates, backup equipment strategies, repair times and strategies, and effects of preventive maintenance. The ADAS inherent availability at a node shall not be less than 0.9997, excluding noncritical equipment and excluding FAA-supplied air conditioning and power.

3.4.5 Portability. Each equipment item fabricated or procured for the ADAS system shall, in its packed-for-shipment configuration, be capable of being transported via common surface or air carriers. Size, weight, and other physical characteristics shall be consistent with the provisions of section 3.2.1 and section 5 of this specification.

3.4.6 Additional quality factors. The contractor shall establish and maintain a Quality Control Program in accordance with the contract.

3.5 Logistics.

3.5.1 Support concept.

3.5.1.1 Support and test equipment (S&TE). S&TE shall be identified and documented in accordance with the Statement of Work. The test equipment necessary for system maintenance, i.e., fault isolation down to the LRU level, shall be kept to a minimum. These functions shall be primarily represented by built-in test diagnostics and equipment with ADAS.

3.5.1.2 Maintenance. A two-level maintenance concept shall be employed for the ADAS. These two levels are: (1) site (organizational) and (2) depot.

The locations at which the respectivemaintenance tasks will be performed are: (1) the ACF and (2) the FAA depot/Original Equipment Manufacturer (OEM). Maintenance shall be in accordance with FAA Order 6000.30a.

3.5.1.2.1 Site (ACF)-level maintenance. Maintenance shall be performed at this level on systems, subsystems, and support equipment in direct support of ACF operations. It shall include system maintenance monitoring, system fault isolation, and correction of system failures through the removal and replacement of LRUs, but shall not include disposition, repair, service, calibration, and verification of the removed LRUs. Removed LRUs shall be forwarded to the FAA depot.

3.5.1.2.2 Depot-level maintenance. This level of maintenance shall be the responsibilitfor repair of LRUs, such as printed circuit boards, which are beyond the economic or skill capability of the shop maintenance level.

3.5.2 Support facilities. Support facilities shall be installed at the FAA Technical Center in Atlantic City and FAA Academy in Oklahoma City.

3.5.2.1 Hardware support. The ADAS will be installed in the existing 23 ACF sites, the FAA Technical Center, and the FAA Academy. Installationshall not require modification of existing facilities. Quantitative requirements, in sufficient detail, shall be developed for usage of existing facilities and equipment so that availability may be verified. Table 8 outlines the hardware required for the ADAS development and field systems.

3.5.2.2 CSCI support. The ADAS shall specify the facilities, equipment, and software required for Computer Software Configuration Item (CSCI) support during the systems operational life. The requirements shall be specifiedwith considerations to the following:

(a) Number and types of computers (cf 3.2.10, 3.3.1, 3.3.2.1.1).

(b) Computer peripherals (cf 3.2.1.3).

(c) Software tools (cf 3.3.2.2.2, 3.3.3.2.3, 3.3.2.1.4).

(d) Facilities.

(e) System utilities (cf 3.3.2.1.2, 3.3.2.1.4).

(f) Firmware support equipment.

3.5.3 Supply. The ADAS design shall make maximum use of standard, approved partsalready in the government inventory.

(a) The spares provisioning shall fully consider use of the FAA system for supply support and spares control action.

6. NOTES

6.1 Acronyms. Following is an alphabetical list of acronyms commonly associated with the ADAS system that appear in this specification. Entries followed by an asterisk (*) are explained further in a Glossary, 6.2.

AC	Alternating Current
ACF	Area Control Facility
ADAS	AWOS Data Acquisition System *
ADCCP	Advanced Data Communication Control Protocol *
ADU	Application Data Unit *
ANSI	American National Standards Institute
AOS	Automated Observing System
ARTCC	Air Route Traffic Control Center
ASC	ADAS System Console
ASCII	American Standard Code for Information Interchange
ASOS	Automated Surface Observing System
AWOS	Automated weather Observing system *
BITE/BIT	Built-In Test Equipment/Built-In Test
bps	Bits-per-second
CASE	Computer-Aided Systems Engineering
CI	Configuration Item
CPU	Central processing unit *
CSC	Computer Software Component *
CSCI	Computer Software Configuration Item *
CT	Configuration Test
CTS	Coded Time Source

6. NOTES

6.1 Acronyms. Following is an alphabetical list of acronyms commonly associated with the ADAS system that appear in this specification. Entries followed by an asterisk (*) are explained further in a Glossary, 6.2.

AC	Alternating Current
ACF	Area Control Facility
ADAS	AWOS Data Acquisition System *
ADCCP	Advanced Data Communication Control Protocol *
ADU	Application Data Unit *
ANSI	American National Standards Institute
AOS	Automated Observing System
ARTCC	Air Route Traffic Control Center
ASC	ADAS System Console
ASCII	American Standard Code for Information Interchange
ASOS	Automated Surface Observing System
AWOS	Automated weather Observing system *
BITE/BIT	Built-In Test Equipment/Built-In Test
bps	Bits-per-second
CASE	Computer-Aided Systems Engineering
CI	Configuration Item
CPU	Central processing unit *
CSC	Computer Software Component *
CSCI	Computer Software Configuration Item *
CT	Configuration Test
CTS	Coded Time Source

LU	Logical Unit *
MOSI	Microprocessor Operating System Interface
MPS	Maintenance Processor Subsystem *
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NADIN	National AirspaceDataInterchange Network *
NAS	National Airspace system *
NEC	National Electrical Code
NFPA	National Fire Protection Association
NOS	National Ocean Service
NWS	National Weather Service
OSHA	Occupational Safety and Health Administration
OSI	Open System Interconnection *
OT&E	Operational Test and Evaluation
PDL	Program Design Language *
PVC	Permanent Virtual Circuit *
PSN	Packet Switch Network *
RS	Record Special (observation)
RTC	Real Time Clock
RVR	Runway Visual Range
RWP	Realtime Weather Processor
S&TE	Support and Test Equipment
SA	RecordObservation
SAO	Surface Aviation Observation

LU	Logical Unit *
MOSI	Microprocessor Operating System Interface
MPS	Maintenance Processor Subsystem *
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NADIN	National AirspaceDataInterchange Network *
NAS	National Airspace system *
NEC	National Electrical Code
NFPA	National Fire Protection Association
NOS	National Ocean Service
NWS	National Weather Service
OSHA	Occupational Safety and Health Administration
OSI	Open System Interconnection *
OT&E	Operational Test and Evaluation
PDL	Program Design Language *
PVC	Permanent Virtual Circuit *
PSN	Packet Switch Network *
RS	Record Special (observation)
RTC	Real Time Clock
RVR	Runway Visual Range
RWP	Realtime Weather Processor
S&TE	Support and Test Equipment
SA	RecordObservation
SAO	Surface Aviation Observation

WMSCR Weather Message Switching Center Replacement

6.2 Glossary

Adaptive parameter. A parameter by which a standard system may be adapted or configured to a given site or processing requirement. Cf Configurable Data.

ADAS specialist. See Specialist.

Advanced Data Communications Control Protocol (ADCCP). Also called ANSI X3.66, an American rendering of ISO HDLC, ADCCP is a link-level, bit-oriented synchronous protocol widely used for U.S. Government and military communications systems. ADCCP has a wide variety of options that permit it to support users with different requirements. The BA option, as specified in FIPS PUB 78, renders ADCCP nearly identical to CCITT X.25 LAPB. ADAS uses both the balanced and unbalanced options.

Alarm. A state of a Data Point (cf) indicating component(s) failure with associated loss of service to the user.

Application Data Unit (ADU). The data unit associated with the highest ISO/OSI layer, the ADU consists of an application header and a message defined exclusively within the context of a computer application.

Application layer. A highest-level communications architecture layer, providing semantic product description services to a communications user.

Application software. Software specific to the functions performed by a particular system. It does not include "system" software.

Asynchronous. Not related or coordinated in time. Within ADAS, primarily refers to independent processes charged with the performance ofdiscrete operational or communications functions.

Automated Observing System (AOS). A Department of Defense (DOD) system, located at selected airports, composed of meteorological sensors, processor, and communications outputs. Meteorological parameters such as wind speed, winddirection, temperature, dew-point temperature, pressure, precipitation, visibility, and cloud height are measured, and then processed through averaging and analyzing routines.

Automated Surface Observing System (ASOS). A National Weather Service (NWS) system, located at selected airports, composed of meteorological sensors, processor, and communications outputs. Meteorological parameters such as wind speed, wind direction, temperature, dew-point temperature, pressure,

precipitation, visibility, and cloud height are measured, and then processed through averaging and analyzing routines.

Automated Weather Observing System (AWOS). An FAA-sponsored system, located at selected airports, composed of meteorological sensors, processor, and communications outputs. Meteorological parameters such as wind speed, wind direction, temperature, dew-point temperature, pressure, precipitation, visibility, and cloud height are measured, and then processed through averaging and analyzing routines.

Automatic. A term that applies to an activity or function that is performed by the ADAS without human specialist intervention.

AWOS Data Acquisition System (ADAS). Refer to Section 1 for an introduction to ADAS.

Balanced Asynchronous Option (BA option). An option of the ADCCP protocol, as specified in FIRS PUB 78, that makes it similar to the CCITT X.25 link layer protocol.

Bandwidth. A measure of the capacity of a communication link (usually the higher speed links) as measured in bps.

Bit (Binary digit). The smallest unit of information in computer or communications operations, represented by either of the two binary numerals, 0 or 1.

Blocking factor. Within ADAS, a parameter denoting the maximum size of a specified queue buffer in units of messages and/or bytes.

Byte. A set of data 8 bits in length.

Central Processing Unit (CPU). The CPU is the principal control and computational element of a computer system. It consists typically of a program control unit, arithmetic and logical operation unit, and channels for data exchange with peripherals.

Change Message. A message to the MPS initiated by ADAS on detection of a data point alarm condition or a change in a status data point

Checkpointing The action of saving dynamic system parameters at a given point in time:

Circuit. A communications pathway between two systems or subscribers. A circuit may be a physical pathway (e.g., copper wire, microwave equipment, etc.), or a conceptual entity representing the pathway over a communication utility, (e.g., PSN).

precipitation, visibility, and cloud height are measured, and then processed through averaging and analyzing routines.

Automated Weather Observing System (AWOS). An FAA-sponsored system, located at selected airports, composed of meteorological sensors, processor, and communications outputs. Meteorological parameters such as wind speed, wind direction, temperature, dew-point temperature, pressure, precipitation, visibility, and cloud height are measured, and then processed through averaging and analyzing routines.

Automatic. A term that applies to an activity or function that is performed by the ADAS without human specialist intervention.

AWOS Data Acquisition System (ADAS). Refer to Section 1 for an introduction to ADAS.

Balanced Asynchronous Option (BA option). An option of the ADCCP protocol, as specified in FIRS PUB 78, that makes it similar to the CCITT X.25 link layer protocol.

Bandwidth. A measure of the capacity of a communication link (usually the higher speed links) as measured in bps.

Bit (Binary digit). The smallest unit of information in computer or communications operations, represented by either of the two binary numerals, 0 or 1.

Blocking factor. Within ADAS, a parameter denoting the maximum size of a specified queue buffer in units of messages and/or bytes.

Byte. A set of data 8 bits in length.

Central Processing Unit (CPU). The CPU is the principal control and computational element of a computer system. It consists typically of a program control unit, arithmetic and logical operation unit, and channels for data exchange with peripherals.

Change Message. A message to the MPS initiated by ADAS on detection of a data point alarm condition or a change in a status data point

Checkpointing The action of saving dynamic system parameters at a given point in time:

Circuit. A communications pathway between two systems or subscribers. A circuit may be a physical pathway (e.g., copper wire, microwave equipment, etc.), or a conceptual entity representing the pathway over a communication utility, (e.g., PSN).

Erroneous message log (error.log). A system log recording any erroneous contents of messages exchanged between ADAS and other NAS nodes.

Event log. A system log recording significant events detected in the course of operation.

Format. A predetermined arrangement of bit sequences, characters, fields, lines, and/or punctuation, as utilized for the organization of data storage, transmission, or display.

Frame. A link layer data element, exchanged on X.25 and ADCCP interfaces. Frames are delimited by the framing character, hexidecimal 7E.

Full duplex. A characteristic of communications circuits allowing them to exchange data simultaneously in both directions.

Header. The initial part of a message containing fields that define the contents. Both AWOS- and SAO-formatted ADAS messages have headers.

Help Function. On-line assistance to interactive users of a system, integrated in a software product and designed for multiple user-competence levels.

Initialization State. The State of ADAS when the system is being prepared for its active mission.

Interactive Process Simulator (IPS). In the context of the ADAS specification, the IPS is a test and demonstration resource designed to duplicate the operation and behavior of the ADAS communications network and ADAS subscribers. It will permit testing of the ADAS system, via data introduction to that system, prior to the availability of actual communication interfaces.

Interface. A connection point that links system elements with defined characteristics, used most often in this specification to denote physical circuits between ADAS and other systems.

International Organization for Standardization/Open System Interconnection Model. See ISO/OSI Model.

ISO/OSI Model (International Organization for Standardization/Open System Interconnection Model). A seven-layer organizational mechanism for defining the procedures and formats for data exchange between two interconnecting systems.

Link. A pathway for the exchange of data between two systems. See Circuit.

Link Access Protocol Balanced (LAPB). The link protocol defined in the X.25 protocol. It is a bit-oriented, synchronous protocol between peer systems.

Link (Datalink) Layer. The second layer of communications architectures, providing reliable transmission of units (frames) of data between nodes of a network.

Line Replaceable Unit (LRU). The smallest hardware element of the system that can be exchanged without repair. An LRU is a repairable unit consisting of a combination of components, parts, assemblies, subassemblies, etc., which, when removed and replaced, will restore the larger entity within which it operates to an operational configuration. It excludes items falling under the definition for a repair/piece part.

Logical Unit (LU). A hardware, software, or status maintenance reporting group, consisting of a specified set of Data Points (cf).

Macrostate. A dimension of the overall status of a system considered as an integrated whole.

Maintenance Processor System (MPS). A NAS systemresponsible fordetermining the status of each system component. The ADAS Maintenance subsystem sends reports of system status to the MPS on request or on detection of system changes.

Messacre. A unit of bit sequences and/or text characters transmitted over a communications medium or between software processes. A product is a class of message.

Microstate. The state (cf) of a discrete specified component or part of a system.

Mission. The purpose or primary function of a system. See 3.1.1 for a specification of the ADAS mission.

Mode (of operation). Within a given State (cf) of a system, one of a specified set of alternative scenarios for system operation.

NADIN Packet Switch Network (PSN). The NADIN PSN is a packet switched network that will provide the data switching capabilities and network monitoring functionsrequired to meetfuture FAA communication needs.

NADIN II. The NAS plan project to procure the hardware/software of the NADIN PSN.

NAS Plan. An FAA proposal that outlines a number of modernization programs designed to improve the collection, analysis, and dissemination of weather

information with the objective of enhancing the safety and efficiency of the NAS. The ADAS is one of these programs.

National Airspace Data Interchange Network (NADIN). Facilities used for data exchange between NAS systems. NADIN consists of a Message Switch network (NADIN IA) and Packet network (NADIN II).

National Airspace System (NAS). The common network of U.S. airspace composed of air navigation facilities, equipment and services, airports or landing areas, aeronautical charts, information and services, rules, regulations and procedures, technical information, manpower, and material.

Network Layer. The third layer in communications architectures (ISO/OSI, X.25), providing routing and flow control for units (packets) of data through a network.

Node. Within this specification, any externally communicating element addressing and/or addressed by the ADAS.

Noncritical. The condition of ADAS When a noncritical failure has been observed. A noncritical failure is one that permits the continuation of ADAS mission performance, with possible partial loss of service.

Nonrecursive. Within ADAS failure operation, indicates the use of failure-processing and shutdown algorithms that exclude within themselves the possible use of failed components, and that recognize the Shutdown State.

Nonvolatile Data Store. Data stores Whose values persist reliably after the removal of line power.

Normal operation. The condition of ADAS when operating in the absence of any failure conditions and unattended by a human specialist.

Off-line. (1) Within ADAS, a term related to the performance of maintenance, diagnostic, or certification procedures by a specialist at an ACF. (2) A designation for computer resources, including peripherals and storage, normally requiring operator intervention to mount or attach.

Off-the-shelf. An item produced and placed in stock by a contractor, or stocked by a distributor, before receiving an order or contract for its sale. The item may be commercial or produced to military or federal specifications or description.

On-line. (1) A term related to specialist interface control activities during ADAS application software execution. (2) A designation for computer resources, including peripherals and storage, normally attached and ready for use.

information with the objective of enhancing the safety and efficiency of the NAS. The ADAS is one of these programs.

National Airspace Data Interchange Network (NADIN). Facilities used for data exchange between NAS systems. NADIN consists of a Message Switch network (NADIN IA) and Packet network (NADIN II).

National Airspace System (NAS). The common network of U.S. airspace composed of air navigation facilities, equipment and services, airports or landing areas, aeronautical charts, information and services, rules, regulations and procedures, technical information, manpower, and material.

Network Layer. The third layer in communications architectures (ISO/OSI, X.25), providing routing and flow control for units (packets) of data through a network.

Node. Within this specification, any externally communicating element addressing and/or addressed by the ADAS.

Noncritical. The condition of ADAS When a noncritical failure has been observed. A noncritical failure is one that permits the continuation of ADAS mission performance, with possible partial loss of service.

Nonrecursive. Within ADAS failure operation, indicates the use of failure-processing and shutdown algorithms that exclude within themselves the possible use of failed components, and that recognize the Shutdown State.

Nonvolatile Data Store. Data stores Whose values persist reliably after the removal of line power.

Normal operation. The condition of ADAS when operating in the absence of any failure conditions and unattended by a human specialist.

Off-line. (1) Within ADAS, a term related to the performance of maintenance, diagnostic, or certification procedures by a specialist at an ACF. (2) A designation for computer resources, including peripherals and storage, normally requiring operator intervention to mount or attach.

Off-the-shelf. An item produced and placed in stock by a contractor, or stocked by a distributor, before receiving an order or contract for its sale. The item may be commercial or produced to military or federal specifications or description.

On-line. (1) A term related to specialist interface control activities during ADAS application software execution. (2) A designation for computer resources, including peripherals and storage, normally attached and ready for use.

Queue. An ordered list of messages. In ADAS a queue structure is defined as a requirement in order to exchange data between system elements operating at inherently different rates (e. g., circuits and product processing).

Response report. An organized and formatted display of data as requested by specialist interface commands.

Response time. The time between receipt of a stimulus and the activity which results from that stimulus.

SA format. A format used to code surface aviation (SA) weather observations. The format used for international stations is METAR code; Airways code is used for domestic (including Mexican) stations.

Shutdown State. The State of ADAS when the system is being deinitialized and closed in preparation for software exit.

Software status register. An analogue to the common hardware status register often used in isolated hardware components (boards, etc.). A data store used by software to record the current state of any specified system component.

Specialist (ADAS Specialist). Personnel assigned to the local maintenance of an ADAS installation.

Specialist interface function. The means provided within ADAS for a specialist to exercise control over the system.

Stage. A phase of the implementation of ADAS service within the NAS. See Transition State and End State.

State (1) Any one of a specified domain of discrete values representing the operational condition of any defined component of a system at a given time. (2) As capitalized within this specification (State), the operational condition of the ADAS system considered as a whole, with the domain (Initialization, Operational, Shutdown), cf.

State change message. A change message announcing to the MPS any change in a status logical unit data point.

Static data. Adaptation and configuration data, including security information, utilized by the communications, processing and control functions in the automatic control and direction of system execution. Within ADAS static data may be modified only under specialist interface control.

Statically configurable. An attribute of certain data, connoting that the constraints respecting static data (cf) and configurable data (cf) shall apply to it.

Status. see state (1).

System Failure. The condition of ADAS when a critical failure persists through possible retry/restart procedures, requiring the termination of ADAS mission processing and the transition to the Shutdown State.

System manager. ACF personnel charged with the maintenance of ADAS security functions.

System software. Software provided with the specific computer hardware which performs support functions for the application. System software consists of an operating system, compilers and other development tools, data base management systems, and various utility programs. see Operating system.

Test bed. A feature of the ADAS that permits the development of all ADAS application software and the testing of software from individual modules up to the entire system.

Text. (1) That part of a displayable message following and exclusive of the header. (2) Any displayable data.

Transition State. The stage of implementation of ADAS service characterized by the use of the NADIN PSN for communication with all NAS end processors of ADAS output.

Transport Layer. The fourth layer in the 7-layer ISO/OSI communications architecture, providing reliable, sequenced exchange of data across a network between two end users.

Unit. The smallest logical software entity specified in the detailed design which completely describes a single function insufficient detail to allow implementing code to be produced and tested independently of other units.

Virtual Circuit (VC). A connection-oriented mode of transmission in packet-switched networks, in which data flows sequentially along a shared connection path. Regular VC service requires that data transmission be preceded with a negotiated establishment of connection between subscribers, and followed by disconnection. See Permanent Virtual Circuit.

Volatile Data Store. Data storage whose values become indeterminate with the removal of power from the storage media (not to be confused with Volatile Data, cf).

Volatile Data. see Dynamic Data.

Warm start. See Cold start.

WMO transmission envelope. The WMO transmission envelope consists of a leading SOM (hexidecimal 01) at the start of the message and a trailing ETX (hexidecimal 04) at the end of the message.

World Meteorological Organization (WMO). An international agency under the United Nations, headquartered in Geneva, Switzerland, whose objective is to promote human benefit and economic growth through the coordination of meteorological programs, standardization of meteorological procedures and communications, exchange of data and techniques, and expansion of meteorological capabilities, particularly in developing countries.

X.25. A CCITT standard defining procedures in the lower three ISO/OSI layers for the management of DTE/DCE interfaces. These standards are used by the NADIN PSN.

6.3 Index

WMO transmission envelope. The WMO transmission envelope consists of a leading SOM (hexidecimal 01) at the start of the message and a trailing ETX (hexidecimal 04) at the end of the message.

World Meteorological Organization (WMO). An international agency under the United Nations, headquartered in Geneva, Switzerland, whose objective is to promote human benefit and economic growth through the coordination of meteorological programs, standardization of meteorological procedures and communications, exchange of data and techniques, and expansion of meteorological capabilities, particularly in developing countries.

X.25. A CCITT standard defining procedures in the lower three ISO/OSI layers for the management of DTE/DCE interfaces. These standards are used by the NADIN PSN.

6.3 Index

through polling. When ADAS polls IPS-simulated AWOSs, IPS shall answer with a mixture of valid and erroneous messages. For LDD messages, a testmessage shall be sent to AWOS to verify the LDD capability.

(b) On the CTS link, the receipt of timing data by ADAS shall be verified.

(c) On the ADAS/NADIN II links (WCP, RWP, and WMSCR), ADAS and interfacing systems are coequal and each can initiate transmission. Messages that IPS receives from ADAS over the NADIN II network shall be printed and verified. Messages sent from the IPS to the ADAS over the NADIN II network shall be printed and verified together with the results of ADAS processing.

10.5 Functional attributes. The following functional attributes are suggested for the IFS:

(a) Pre-Processor function

(b) Real-Time Test Processor function

(c) Post-Processor function

(d) Data Display function

10.5.1 Pre-processor function. This IPS function provides for the creation of the test environment. The test environment consists of an ordered set of ADAS test messages and a set of system configuration information. A test technician shall be able to repeat each test exactly from these sets.

10.5.1.1 Defining the test configuration. The user shall be able to define and store for future use all test configuration parameters (e. g. channel and communication controller assignments). The user shall be able to enter configuration data from the IPS console in response to screen menus.

10.5.1.2 Defining test data. The user shall be able to create and edit test data messages. The user shall have normal data editing capabilities such as insertion, deletion, merger, and concatenation, and the capability to generate message sets orportions of sets with the incorporation of randomized weather data. Data randomizing functions should have the capability to generate large quantities of message data with varying patterns of weather change; this data be edited by the userfor testing specific ADASfunctions.

10.5.1.3 AWOS test messages. The user shall be able to create simulated AWOS messages, conforming to the ADAS/AWOS ICD, in either of two ways:

(a) By manually entering values to each field in response to screen prompts.

(b) By selecting random data generation, with data fields filled by a random number generator within preset limits,

Messages shall be preserved as they are generated to produce ordered data sets containing varying weather values for ADAS processing. Each message set shall be associated with a specific AWOS site or multiple sites as specified during test initiation.

10.5.1.4 MPS test messages. The user shall be able to create simulated MPS messages in accordance with specifications set forth in the ADAS/MPS ICD. The user shall manually enter values for each field of an MPS message in response to IPS console prompts. MPS messages can be placed in MPS message sets, inserted into AWOS message sets, or composed during execution of the ADAS tests through operator menus and prompts.

10.5.1.5 Creating the test environment. The user shall be able to create an environment for a specific test. Any test shall be repeatable as needed in the designed test environment. To create the test environment, the user shall be able to:

(a) Select a test number to be associated with the specified configuration.

(b) Select any combination of interfacing systems involved in the test, including that of all systems working simultaneously (simulating maximum load on ADAS).

(c) Select a configuration data set defining assignment of system resources.

(d) Assign AWOS message sets (selected from those created previously) to the simulated AWOS sites.

(e) Select message sets with non-AWOS simulated messages.

(f) Specify whether simulated CTS is to be used, and if so, specify CTS timedrift.

10.5.2 Real-time processor function. This IPS function shall provide execution of selected tests in the environment defined by the Pre-Processor Function. A test initiation menu shall allow the user to define test execution parameters (e.g. the number of test repetitions). On test initiation, the IPS shall execute the following tasks:

(a) Present and monitor a console user menu of real-time test control functions.

(b) Receive, verify, and record all messages on all communication lines.

(b) By selecting random data generation, with data fields filled by a random number generator within preset limits,

Messages shall be preserved as they are generated to produce ordered data sets containing varying weather values for ADAS processing. Each message set shall be associated with a specific AWOS site or multiple sites as specified during test initiation.

10.5.1.4 MPS test messages. The user shall be able to create simulated MPS messages in accordance with specifications set forth in the ADAS/MPS ICD. The user shall manually enter values for each field of an MPS message in response to IPS console prompts. MPS messages can be placed in MPS message sets, inserted into AWOS message sets, or composed during execution of the ADAS tests through operator menus and prompts.

10.5.1.5 Creating the test environment. The user shall be able to create an environment for a specific test. Any test shall be repeatable as needed in the designed test environment. To create the test environment, the user shall be able to:

(a) Select a test number to be associated with the specified configuration.

(b) Select any combination of interfacing systems involved in the test, including that of all systems working simultaneously (simulating maximum load on ADAS).

(c) Select a configuration data set defining assignment of system resources.

(d) Assign AWOS message sets (selected from those created previously) to the simulated AWOS sites.

(e) Select message sets with non-AWOS simulated messages.

(f) Specify whether simulated CTS is to be used, and if so, specify CTS timedrift.

10.5.2 Real-time processor function. This IPS function shall provide execution of selected tests in the environment defined by the Pre-Processor Function. A test initiation menu shall allow the user to define test execution parameters (e.g. the number of test repetitions). On test initiation, the IPS shall execute the following tasks:

(a) Present and monitor a console user menu of real-time test control functions.

(b) Receive, verify, and record all messages on all communication lines.

interfacing systems. In the actual NAS environment, error messages shall be transmitted to the ADAS only in response to received erroneous messages; IPS, however, shall initiate non-triggered error messages to test this ADAS functionality. IPS shall timestamp and send to the storage subfunction IPS-initiated messages.

10.5.2.5 Storage subfunction. This subfunction shall provide for permanent storage of IFS test messages for future analysis and interpretation. Messages shall be stored in those formats defined in respective ICDs, with headers consisting of timestamps and message provenance.

10.5.3 Post-processor function. This function shall provide for analysis and interpretation of IPS test results. A console user menu shall permit selection of the mode of display of messages recorded during the test (screen or hardcopy) and the time interval for which the messages are to be displayed. Messages shall be displayed in readable format and shall correspond to message definitions provided in the ICDs.

10.5.4 Data display function. This function shall provide for the display (screen or hardcopy) of the contents of any data set created during the preparation of test messages, environment, and configuration, as well as directories of all data pertaining to a particular test. The following data shall be displayed on request:

(a) Configuration data set.

(b) Test data set, containing selections made during test preparation.

(c) Message data set, containing messages created during test data editing sessions.

(d) Directory of data sets pertaining to a particular test number.

Data set contents shall be displayed in readable format. Messages shall be displayed in the format specified in the corresponding ICD.

FAA-E-2804
March 24, 1988

U.S. Department
of Transportation

**Federal Aviation
Administration**

U.S. Department of Transportation

Federal Aviation Administration

Specification

AWOS Data Acquisition System